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Learning for Sustainability in an Age of Wicked Problems: A Conceptual Review

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Kestävä kehitys on kiistelty käsite, mutta varmaa on, että isoja kestävyysmurroksia tarvitaan, jotta globaali hyvinvointi voidaan varmistaa planeetan sietokyvyn rajoissa. Yhdistyneiden kansakuntien Agenda2030 tarjoaa globaalin vision ja suuntaviivat kohti kestävämpää maailmaa. Oppiminen ja koulutus ovat hyvin keskeisessä roolissa sen tavoitteiden saavuttamiseksi. Tämä pro gradu –tutkielma on käsitteellinen kirjallisuuskatsaus, joka tutkii kansainvälistä ja pääosin vertaisarvioitua kestävän elämäntavan ja kestävän kehityksen kasvatuksen tutkimusta. Tavoitteena on selvittää, millaiset tekijät selittävät kestävää elämäntapaa ja miten kasvatus, koulutus ja oppiminen voivat edistää kestävyysmurroksia.

Kestävään elämäntapaan vaikuttavat useat demografiset, sisäiset ja ulkoiset tekijät, kuten ikä, luontosuhde, minäpystyvyyskokemus, kulttuuriset normit ja lapsuuden kokemukset. Koulutuksen ja kestävän elämäntavan välillä vaikuttaa olevan yhteys. Tyypillistä kuitenkin on, että ihmisten arvot, asenteet, huoli tai tietoisuus eivät aina näy heidän käytöksessään. Kestävän kehityksen kasvatus on kansainvälisesti tuettu lähestymistapa kasvatukseen, joka edistää kestävää kehitystä erityisesti kehittämällä oppijoiden kompetensseja. Kestävän kehityksen kasvatus voi olla merkittävässä roolissa kestävyysmurrosten mahdollistamisessa tarjoamalla merkityksellisiä formaaleja, non-formaaleja ja informaaleja oppimiskokemuksia kaikenikäisille ihmisille. Pedagogiset ratkaisut, jotka mahdollistavat kriittisen pohdinnan, kokemuksellisen oppimisen, aidon osallistumisen ja monialaisen yhteistyön sekä ylläpitävät positiivista tulevaisuudenkuvaa tukevat transformatiivista kestävän kehityksen kasvatusta. Yksilöiden oppimiskokemukset eivät kuitenkaan riitä, mikäli ympäröivä yhteiskunta ei tue kestävää elämäntapaa tai kestävyysmurroksia. Jotta isoihin ja kiireellisiin kestävyyshaasteisiin voidaan löytää ratkaisuja, tarvitaan kaikkien yhteiskunnan osapuolten yhteinen ja jatkuva oppimisprosessi.

Avainsanat: Kestävän kehityksen kasvatus, kestävä elämäntapa, kestävyysmurrokset, elinikäinen oppiminen, sosiaalinen oppiminen, transformatiivinen oppiminen

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Sustainable Development is a contested concept, yet some major transformations towards a more sustainable world must occur to ensure global wellbeing within planetary boundaries. The United Nations' Agenda2030 provides a global vision for pathways towards sustainability. For achieving its goals, learning and education are in a crucial role. This thesis is a conceptual literature review synthesising international and mainly peer-reviewed research on sustainable behaviour and Education for Sustainable Development (ESD). The aim is to explore what kinds of factors explain sustainable behaviour and how learning and education can further sustainability transformations.

Sustainable behaviour is influenced by several demographic, internal and external factors such as age, nature connectedness, sense of self-efficacy, cultural norms, and childhood experiences. Furthermore, there seems to be a link between education and sustainable behaviour, yet it is typical that people's behaviours demonstrate a value-action, attitude-action, concern-action, or knowledge-action gap. ESD is an internationally promoted approach to education, which advances Sustainable Development especially through developing learners' competencies. Through providing meaningful formal, non-formal and informal learning experiences for people at all ages, ESD has potential to drive sustainability transformations. Pedagogical solutions that allow critical deliberation, experiential learning, authentic participation and multi-actor collaboration while maintaining hope seem to support implementing transformative ESD. However, individual learning experiences are undermined if the surrounding society does not support sustainable behaviour and sustainability transformations. Thus, the magnitude and urgency of the current local and global problems require a joint and continuous learning process, which involves all societal actors to collaboratively seek for sustainable solutions.

Keywords: Education for Sustainable Development, Sustainable Behaviour, Sustainability Transformations, Life-Long Learning, Social Learning, Transformative Learning

Contents

1 Introduction

This Master's Thesis in Educational Science aims to conceptualise how learning and education can contribute to more sustainable societies. Studying education in Intercultural Teacher Education programme at University of Oulu has made me very aware of education's societal dimensions and global significance. The thesis draws on my university studies in Finland as well as in England, where I deepened my understanding of how learning and sustainability are interrelated. Furthermore, this study expands on the topics and arguments presented in my Bachelor's Thesis, 'Defining Education for Sustainable Development and Reviewing Pedagogical Approaches for Implementing It', which I completed in autumn 2017. Last year I worked seven months for the Finnish Environment Institute at the Environmental Policy Centre. What I learned during this period has also influenced the chosen perspectives in this study.

In the following sub-chapters, I will argue for the importance of the chosen topic and present a brief overview of the research background. Also, I will introduce the research questions, research methods and the structure of this thesis.

1.1 Research Background

Sustainable Development (SD) has been a widely used and promoted concept internationally for several decades. The first definition of SD was introduced in the Brundtland Report as "development that meets the needs of the present without compromising the ability of future generations to meet their own needs" (World Commission on Environment and Development, 1987). During the past decades, numerous interpretations of SD have been formulated emphasising varying goals and means for achieving them, most of the definitions considering SD to encompass economic, social and environmental pillars (Lozano, 2008, p. 1838; Mebratu, 1998, p. 493). In 2015, the United Nations (UN) launched Agenda2030, an extensive agenda for international development including 17 Sustainable Development Goals (SDGs) and 169 targets that are aimed to be met by 2030. This document strives to guide all stakeholders globally to "take the bold and transformative steps which are urgently needed to shift the world onto a sustainable and resilient path" (UN, 2015, n.p.).

Science as traditionally perceived and conventional scientific tools and approaches may be inadequate for both formulating questions and providing answers to wicked sustainability problems (Miller, 2013, p. 290; Welpi, Kasemir & Jaeger, 2003, pp. 23-24). As Bettencourt and Kaur (2011) argue, "the concept of sustainable development has acquired a global cultural and social dimension that vastly transcends the traditional boundaries of a scientific field" (p. 19544). Sustainability science is a fairly new research field, which has rapidly grown in the number of authors and publications during the past few decades (Bettencourt & Kaur, 2011, p. 19542). It is a maturing field with no clear structure or methodology but it seems to endorse transdisciplinary, holistic, solution-oriented and participatory research methods (Doran, Golden & Turner, 2017, p. 138; Kläy, Zimmermann & Schneider, 2015, p. 81; Miller, 2013, pp. 287-288; Wittmayer & Schäpke, 2014, pp. 485, 489). Inter- and transdisciplinary research from a systemic perspective is crucial for understanding the complexity and interconnectedness of sustainability issues, for supporting more integrated policy-making, and for achieving the SDGs (Imaz & Sheinbaum, 2017, p. 12; Blanc, 2015, p. 14). In Agenda2030, science is mostly perceived to advance the realisation of SDGs through technology transfer and innovation (Imaz & Sheinbaum, 2017, p. 12). However, social sciences, humanities, and other disciplinary areas can greatly contribute to understanding the causes of the current unsustainable path and opportunities for change (ibid.).

There are synergies between educational science and sustainability science and together they can create solutions to some of the most pressing local and global problems (Barth & Michelsen, 2013, p. 103). Barth and Michelsen (2013) argue that the interaction between the fields can occur in two ways (p. 103). In the 'outside-in' approach, sustainability discourse influences educational science by prompting deliberation about the purpose of education, learning contents and pedagogical choices (p. 105). This is evident in the emergence of new educational fields, such as Education for Sustainable Development (ESD) (ibid.). On the other hand, the 'inside-out' approach discloses how sustainability science can benefit from incorporating perspectives from educational science (ibid.). As Barth and Michelsen (2013) describe this, "educational science may offer unique theories and methodological approaches to the study of individual and social learning processes that are to lead to a more sustainable future" (p. 105). This thesis explores how education and learning on all levels of society can promote and drive sustainability transformations elaborating both on the 'outside-in' and 'inside-out' approaches (Barth & Michelsen, 2013).

In addition to ESD, there are several other concepts of education that aim to further sustainability, such as education for sustainability (e.g. Huckle, 1996), learning for sustainability (e.g. Paulus, 2016), sustainability education (e.g. Wals, 2010), sustainable education (e.g. Sterling, 2011a), and climate change education (e.g. Cantell, Tolppanen, Aarnio-Linnanvuori & Lehtonen, 2019). Despite some differences in their emphases, they all promote education, which aims to ensure that learners are able to function in today's rapidly changing world fostering sustainability. ESD also shares many characteristics with Environmental Education (EE) in terms of contents and pedagogies (Eilam & Trop, 2011, p. 44). Nevertheless, Sterling (2011a) argues that ESD covers more topic areas than EE and could be used to describe all initiatives, which promote education for change, such as global citizenship education and intercultural education (pp. 30-31). In this thesis, research on ESD, EE, and fields with similar goals and pedagogies are reviewed. However, as ESD seems to be the most widely used terminology in academic and grey literature, it is mainly used in this thesis for clarity and cohesion.

A rapidly growing number of ESD and EE research has been published during the past decades (Ardoin, Bowers, Wyman Roth & Holthuis, 2018; Barth & Thomas, 2012, p. 752; Barth & Michelsen, 2013, p. 105). Studies on ESD and EE programmes often display positive outcomes, such as increased environmental awareness and changes in attitudes (Ardoin et. al., 2018, p. 9). However, it is typical that people's behaviours demonstrate a value-action, attitude-action, concern-action, or knowledge-action gap (Binder & Blankenberg, 2017, p. 320; Salonen & Åhlberg, 2012, pp. 15, 20; Tam & Chan, 2017, p. 221; Velasco & Harder, 2014, p. 6570). Hence, transformative ESD programmes should not only raise participants' awareness of the topics at question or focus on learners' attitudes but be holistic and increase participants' action competence (Caiman & Lundegård, 2013, p. 438; Hedefalk et. al., 2015, p. 985; Mogensen & Nielsen, 2001, p. 33; Mogensen & Schnack, 2010, pp. 68-69).

However, examining EE programmes' outcomes is difficult and there is little empirical evidence on what makes an EE programme successful and why (Stern, Powell & Hill., 2014, p. 603), a notion which arguably applies also to research concerning ESD. It is easier to measure cognitive learning and level of knowledge than behavioural impacts, thus most research on ESD and EE examines changes in participants' knowledge or attitudes (Ardoin et. al., 2018, p. 11; O'Flaherty & Liddy, 2018, pp. 12-14; Stern et. al., 2014, p. 603). Nevertheless, this type of research fails to capture the multifaceted nature of ESD, and there is a shortage of empirical research concerning the behavioural impacts and evidence disclosing how ESD in-

terventions empower learners to become active change agents (Ardoin et. al., 2018, p. 11; O'Flaherty & Liddy, 2018, pp. 13-14). Regardless of the shortcomings in the field, some conclusions about ESD and how it can empower learners to drive sustainability transformations are made in this thesis drawing on the currently available scientific and academic literature.

There are several synthesising reviews concerning ESD and related fields. Examples of these are O'Flaherty and Diddy's (2018) review on the impact of development education and ESD interventions with participants from primary to tertiary levels of education; Ardoin's et. al. (2018) review on K-12 students' EE programmes' outcomes; Bourn, Hunt & Bamber's (2017) review of ESD and global citizenship education in teacher education; Aikens, McKenzie and Vaughter's (2016) review on environmental and sustainability education policy research; Stern's et. al. (2014) review on young people's EE programme's outcomes; and Hedefalk, Almqvist and Östman's (2015) review on ESD in early childhood education. However, as systematic reviews they all approach ESD from a rather narrow angle (Kennedy, 2007, p. 146).

Being a conceptual review, this thesis can examine the topic in a more flexible and comprehensive manner introducing also new ideas (Kennedy, 2007, p. 146). Elements that are influential for sustainable behaviour are scrutinised acknowledging that education is only one factor determining it. Nevertheless, significant learning must occur globally, and formal, non-formal and informal ESD can facilitate this learning. Therefore, this thesis examines ESD in different contexts and forms, and the pedagogies and learning theories that are elaborated on can be applied in ESD with participants from all ages and backgrounds. As contextual factors greatly shape individuals' everyday behaviours (Gadenne et. al., 2011, p. 7684; Gifford & Nilsson, 2014, p. 141; Kollmuss & Agyeman, 2002, p. 239; Varela-Candamio et. al., 2018, p. 1573), and profound changes on personal and community levels are slow to result (Fischer et. al., 2012, p. 154), focusing only on individuals' learning experiences cannot provide sufficient answers to how a large-scale societal shift towards sustainability can occur (Barth & Michelsen, 2013, p. 111). Therefore, this thesis takes a stance for a more collective approach by introducing a model that suggests what kinds of roles and responsibilities individuals, communities and societies can have in driving sustainability transformations acknowledging that these all levels are needed for enabling sustainability transformations.

1.2 Importance of Research Topic

The current state of the world demands urgent, remarkable changes in dominant values, behaviours, lifestyles and the ways in which societies function to ensure that life-sustaining conditions on this planet are maintained and a peaceful and sustainable future can be secured (e.g. Hofman, 2015, p. 217; Tang, 2017, p. 1; Wals, Mochizuki & Leicht, 2017, p. 783; World Wide Fund (WWF), 2018, p. 8). The world is facing several global problems, such as loss of biodiversity and climate change, which have already led to severe ecological, social and economic problems (Intergovernmental Panel on Climate Change (IPCC), 2018, pp. 7, 11; WWF, 2018, p. 10). These problems are beyond complex and often referred to as 'wicked problems' (e.g. Andersson & Törnberg, 2018; Peters, 2017; Tomkinson, 2011; Waddock, 2013). This means that they are unique issues, which encompass such ambiguous and large webs of interactions that they are hard or impossible to define precisely and there are no clear answers to them, only better or worse attempts to formulate solutions (Andersson & Törnberg, 2018, p. 124; Peters, 2017, p. 388).

After the launch of the new IPCC report in autumn 2018, it seems that SD and mitigating climate change have gained increasing momentum in Finland, and these topics appear regularly on daily news, advertisements and political conversations. A recently published report on first results of the National Forum for Skills Anticipation's anticipation work argue that the most central generic skill in Finland in 2035 will be knowledge of SD (Finnish National Agency for Education, 2019, p. 29). In SDG4, of which focus is on learning, one of the targets is that by 2030 "all learners acquire the knowledge and skills needed to promote sustainable development" (UN, 2015, n.p.). To ensure that sustainability is understood and actions to promote it are taken by everyone during the next years and decades, significant learning must occur on all levels of societies (Barth & Michelsen, 2013, p. 111).

Education is closely linked with all SDGs and none of them can be achieved without quality education (Bengtsson, Barakat & Muttarak, 2018, p. 161; Bokova, 2016, p. i; Sachs, 2016, pp. ii-iii). Securing that education is accessible for all and attaining the targets in SDG4 are crucial steps for responding to the severe and complex issues that concern the whole globe (Bokova, 2016, p. i; Sachs, 2016, pp. ii-iii). However, simply attending school does not guarantee learning. Globally, about 60% of children and adolescents are not learning the basic skills in literacy and numeracy even though most of these children are in school (United Na-

tions Educational Scientific and Cultural Organization (UNESCO) Institute for Statistics, 2017, pp. 2, 14). Furthermore, not all education fosters sustainability nor is helpful for realising the SDGs (Bengtsson et. al., 2018, p. 15; Brissett & Mitter, 2017, p. 201; Orr, 2004, p. 5; Sterling, 2011a, p. 27).

As sustaining economic growth is often prioritised over other aspects of SD, Jickling and Wals (2008) are concerned about educating people for this kind of SD, which abides by global forces of neoliberalism (pp. 3-4). Neoliberal societies foster consumerism, competitiveness and individualism, which are neither sustainable nor successful in promoting happiness (Brissett & Mitter, 2017, pp. 183-184; Salonen & Åhlberg, 2012, p. 21). Furthermore, neoliberal education reinforces inequalities (Portera & Grant, 2017, p. x). Emphasising cognitive and abstract learning, quantifiable learning outcomes, and educating for economic growth undermine the value of developing systems thinking, critical thinking and negotiation skills, as well as skills needed for cultivating functional democracies and for fostering peace in diverse societies (Portera & Grant, 2017, p. x; Nussbaum, 2010, pp. 48, 77; Strachan, 2009, p. 84). Therefore, what education is like, what are its goals, and how it is implemented are crucial questions (Brissett & Mitter, 2017, p. 201).

Furthermore, fostering sustainability in formal education is not enough in building a more sustainable world but also non-formal, informal and life-long learning are needed (Barth, Lang, Luthardt and Vilsmaier, 2017, p. 814). As Janne Hukkinen, professor of environmental policy argues in YLE's (a Finnish public service broadcasting company, 2018) article, the past few decades have not resulted in sufficient progress in solving environmental crises and the 'time of visitation' in finding sustainable solutions in a prompt and controlled way without experiencing abrupt and unforeseen consequences has been missed (Palmolahti, 26.7.2018). Indeed, Figure 1 illustrates that no country has yet been able to cultivate a high level of social wellbeing within the planetary boundaries (O'Neill, Fanning, Lamb & Steinberger, 2018; illustration by Finnish Environment Institute, 2018).

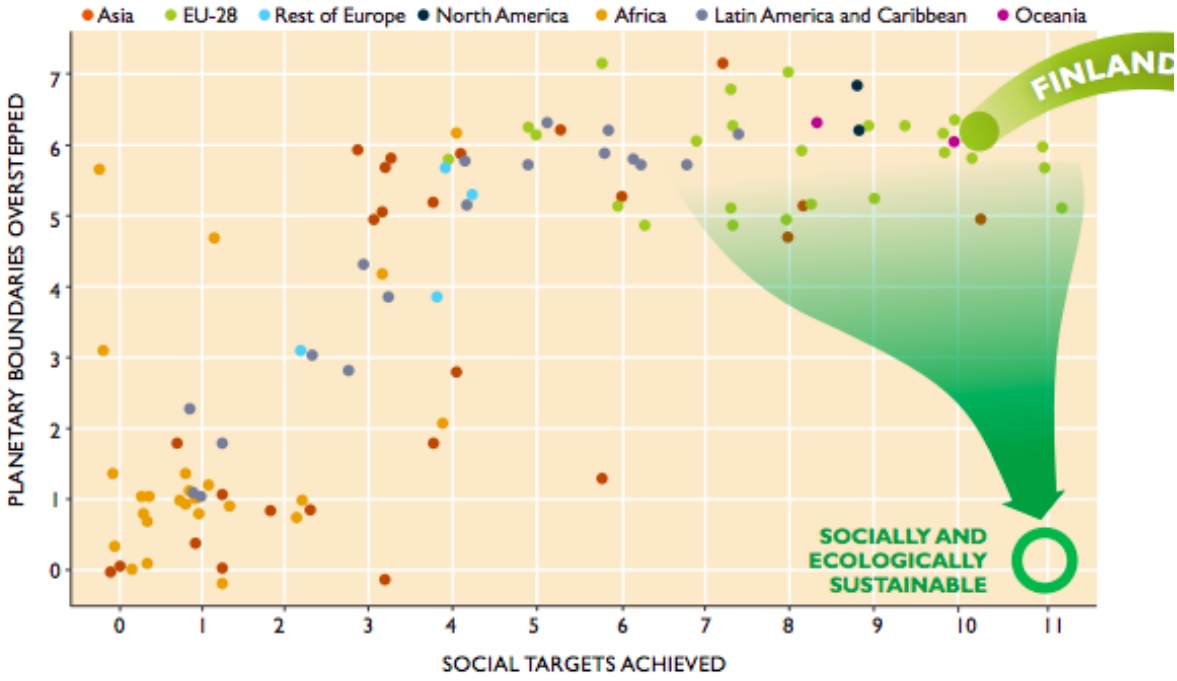

Figure 1. Finnish Environment Institute Policy Brief, 2018, p. 2.

Moreover, regardless of decades of advocacy by the UN, UNESCO, and various other institutions and scholars, ESD has not yet generated remarkable progress towards taking action for SD (Sterling 2011a, p. 31). Thus, waiting a more sustainable world to be built gradually once new generations grow up is not a sufficient approach anymore but rapid and major changes in societies and lifestyles must take place now (IPCC, 2018, p. 17; WWF, 2018, p. 8). Even though childhood and behaviour patterns learnt during it have a major impact on sustainable behaviour (Chawla, 1999, p. 21; Davies et. al., 2009; Evans, Otto & Kaiser, 2018, p. 684; Kos, Jerman, Anžlovar & Torkar, 2016, p. 5554) and children and young people can contribute to a more sustainable world, learning must occur amongst people at all ages including all societal sectors and stakeholders (Barth & Michelsen, 2013, p. 114; Dlouhá, Barton, Janoušková & Dlouhý, 2013, p. 64; Sol, Beer & Wals, 2013, p. 35; Wals, 2011, pp. 181-183). Without this, individual attempts to behave sustainably are undermined and the responsibility of transforming the world is placed overwhelmingly on individuals' shoulders.

1.3 Research Questions

The aim of this thesis is to explore how transformations towards SD can be enabled through individual, community-based and societal learning. The potential that education has in pro-

moting sustainability is contemplated by examining factors that influence sustainable behaviour. Different models of ESD and pedagogical approaches and educational theories that facilitate learning for sustainability are studied in order to understand how education can be organised to respond to the urgent global problems.

This review examines ESD holistically acknowledging that learning always occurs in a social context. In ESD research, it is typical to focus on individuals' learning and competencies (Barth & Michelsen, 2013; Chawla & Cushing, 2007). However, in this thesis, ESD is considered more broadly as an approach to education and learning, which can further sustainability transformations by providing both individual and collective learning experiences for children, young people, adults and different societal actors.

The research questions are:

- Which factors influence individuals' sustainable behaviour based on empirical research and review articles?
- What kind of discursion and empirical evidence is there in academic literature concerning the nature, learning theories, pedagogies and implementation of ESD?

Furthermore, in the discussion part, individuals, communities and societies' potential roles and responsibilities in furthering sustainability transformations are pondered with the aim to illustrate how learning and collaboration on all levels of society are crucial for enabling sustainability transformations.

1.4 Research Methods and Materials

This theoretical Master's Thesis is a conceptual literature review, which allows certain flexibility in the literature search and in composing the review (Kennedy, 2007, pp. 142-145). Using an interdisciplinary approach and reviewing relevant literature from several fields is a necessity in research concerning sustainability (Imaz & Sheinbaum, 2017, p. 12; Blanc, 2015, p. 14). Therefore, this thesis intends to provide a comprehensive, yet not exhaustive, overview of how learning and education can contribute to a more sustainable world synthesising research on pro-environmental and sustainable behaviour, educational science, ESD, environmental policy, sustainability science, and environmental ethics.

Most of the sources cited in this thesis are peer-reviewed articles form international journals, thus they have been almost exclusively written in English. Empirical, theoretical and philosophical literature as well as systematic reviews and synthesising articles are examined in order to provide a holistic understanding of the discussed topics. However, as SD and ESD are often addressed on a philosophical level rather than referring to robust empirical research, some of the assumptions and arguments in this thesis are based mainly on philosophical and theoretical academic literature. As this thesis discusses very contemporary issues and new research from the chosen fields emerge continuously, studies from recent years are in particular utilised. However, some older publications that have significantly influenced the field and later research are also reviewed. In 2012, 127,000,000 sites appeared in a Google search for the term "Education for Sustainable Development" (Karatzoglou, 2013, p. 46), which exemplifies the vast amount of publications relevant to the research questions. Therefore, this thesis is by no means a systematic review and only outlines an overview of sustainable behaviour and its determinants as well as ESD and its nature, pedagogies and implementation.

SD is a concept originally launched by the UN, and together with its sub-organisations the UN promotes SD through for example international agreements, implementation guidelines and follow-up and review publications, which have served as incentives for incorporating ESD in national educational policies (Aikens et. al., 2016, p. 342). Thus, some UN and UNESCO documents and background papers are also cited in this thesis. Furthermore, a few books and book chapters from authors who are distinguished in their fields are discussed, such as literature from Martha Nussbaum, a philosopher who has written several books about education in the modern world, and Stephen Sterling, a prominent scholar in sustainability education.

As this thesis is written in Finland and the author interprets the world from a Finnish perspective, some Finnish examples are presented in this thesis. Even though the aim is to provide a universal image of how learning can facilitate sustainability transformations, many of the articles used have been written by Western academics and the selected point of view and arguments likely reflect a Western and, more specifically, a Nordic worldview. However, examples and case studies from all around the world have been included to provide a broader and less biased understanding of the topic.

The literature search has been done thematically using three electronic databases: ScienceDirect, Oula-Finna online library catalogue and Google Scholar. Also, some articles have been selected through investigating references from already found materials, a method recommended by Randolph (2009, p. 7). There has been no systematic inclusion or exclusion criteria, however, the materials have been selected after reading widely on topics related to the research questions. Moreover, an effort has been made to include materials with diverse views. Altogether 124 articles, books and publications have been examined in order to answer the research questions. 114 of them have been published between 2010 and 2019 and 10 of them before 2010, the oldest articles being from 1996. The selected materials have been classified into five groups and the distribution can be seen below (*Figure 2)*. As several of these publications have either authors or data from several continents, it is not possible to provide an overview of the articles' geographical distribution.

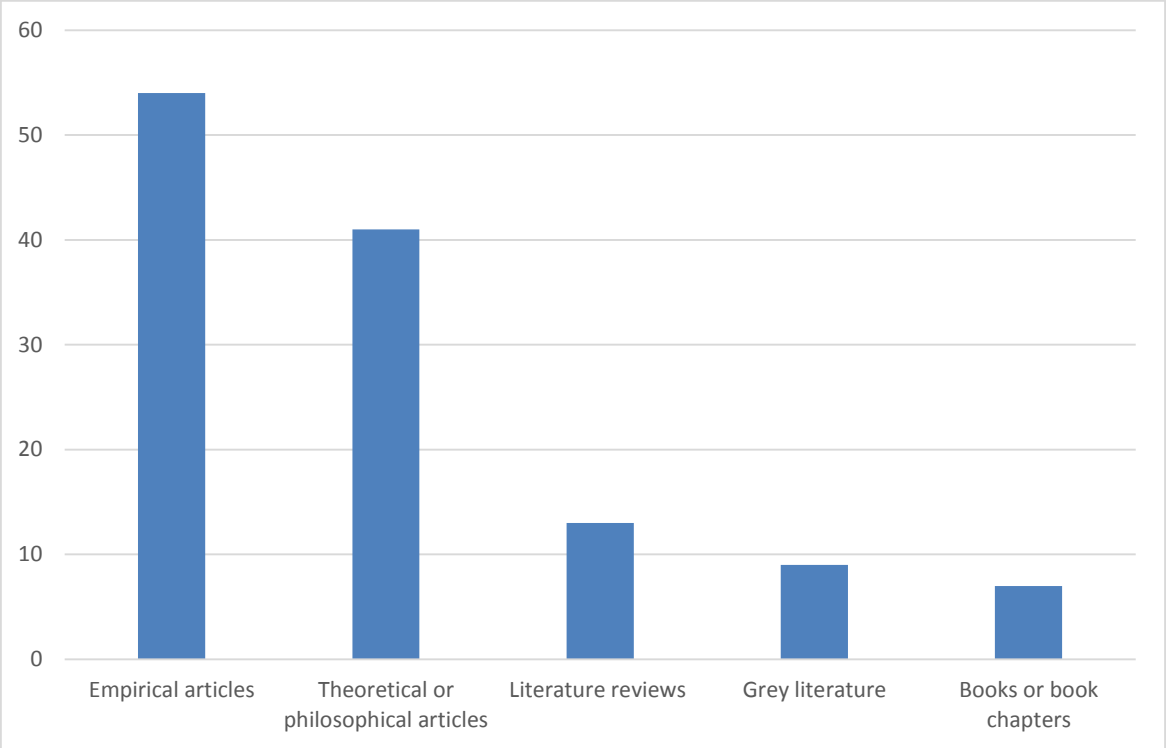

Figure 2. Classification of the Materials (n=124).

1.5 Structure of the Thesis

SD is a contested concept, which can be defined in numerous ways depending on the context in which it is used. Various definitions of SD are scrutinised in chapter two to illustrate the ambiguity and controversiality of the topic while providing a framework through which SD is

interpreted in this thesis. Also, some environmental ethics positions are introduced in this chapter.

Chapter three answers to the first research question by examining what sustainable behaviour is and what kinds of factors explain it. Also, the significance of childhood for sustainable behaviour is discussed in this chapter.

Education is argued to be of great importance in guiding the world towards SD (e.g. Barth & Michelsen, 2013, p. 103; UN Conference on Environment and Development, 1992; UNESCO, 2014a; UNESCO, 2017**)**. Chapters four and five explore what kind of education and learning can succeed in this aiming to provide an answer to the second research question. The nature of ESD as well as learning theories and pedagogical approaches, which are perceived to facilitate learning for sustainability, are reviewed in the chapter four referring both to philosophical and empirical literature. Some remarks about ESD in formal, informal and non-formal contexts are made in chapter five.

In chapter six, Conclusions and Discussion, the main findings of this thesis are concluded. Moreover, this chapter aims to illustrate what kinds of roles and responsibilities individuals, communities and societies can have in terms of furthering SD. Democracy is an inherent part of SD, and a larger-scale societal engagement is needed in order to find best available solutions to wicked sustainability problems (Barth & Michelsen, 2013, p. 114; Miller, 2013, p. 288; Wals, 2011, p. 183; Welpi et. al., 2003, pp. 23-24).

2 Diverse Visions of Sustainable Development

Sustainability itself is a wicked problem (Waddock, 2013, p. 91). Thus, there are no clear answers to what SD means in practical terms and how the world can reach a sustainable state. Neither is there ubiquitous definition for SD (Hopwood, Mellor & O'Brien, 2005, p. 38; Mebratu, 1998, p. 493). On the contrary, SD is a fluid concept and what is sustainable changes constantly when new information emerges and contexts change (Wals, 2010, p. 144). As the word 'sustainable' implies, 'sustaining' is at the core of SD but what to sustain and what to give in, and furthermore, who makes this decision, remain debatable (Martin & Morris, 2009, p. 160). Indeed, this largely varies depending on the organisation or group using the term and reflects their presumptions (Mebratu, 1998, p. 493). Even though some consensus about SD encompassing environmental, social and economic dimensions exists, in practical situations all three of them are rarely considered, and few definitions or solutions give equal importance to all those aspects (Gupta & Vegelin, 2016, p. 435; Hopwood et. al., 2005, p. 40; Mebratu, 1998, p. 493). Moreover, the word 'development' has been contested by several scholars because it may imply an uncritical view of economic growth and technology progress (Wolff, Sjöblom, Hofman-Bergholm & Palmberg, 2017, p. 2).

Some examples of SD models introduced in academia are discussed next. However, it is important to note that more than 70 definitions of SD had already been developed in literature by 1992 (Lozano, 2008, p. 1838), and by now, the amount has been multiplied. This elucidates the diversity in SD discursion.

Mebratu's (1998) model of sustainability, 'The Cosmic Interdependence' (*Figure 3*), opposes the traditional model of sustainability presented in a Venn diagram, which regards the three dimensions of sustainability as separate entities that have partly overlapping interactions (p. 513). Instead, Mebratu's (1998) model recognises the fundamental interdependencies between systems and reveals that while human-related systems (the Social and Economic Cosmoses) are fully dependent on natural systems (the Abiotic and Biotic Cosmoses), these two latter ones exist partly in no interaction with human-related systems (pp. 513-514).

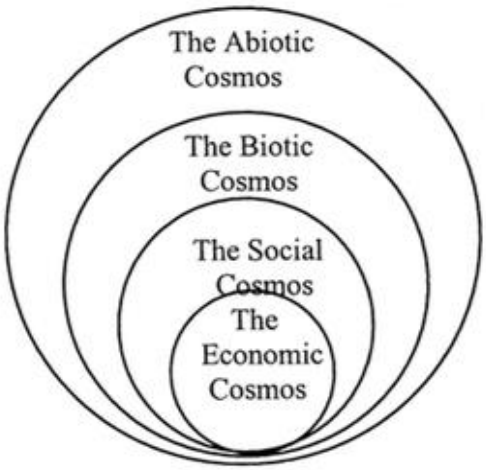

Figure 3. 'The Cosmic Interdependence' (Mebratu, 1998, p. 513).

Salonen, Bardy and Konkka have developed a similar framework to Mebratu's (1998) 'Cosmic Interdependence' model. The 'Ecosocial Approach to Wellbeing' (EAW) framework views the three pillars of SD in a hierarchical manner as a basis for decision-making, action and education with the aim of ensuring good life now and for the future generations (Salonen & Bardy, 2015; Salonen & Konkka, 2015). First, as viable ecosystems are a prerequisite for human life, their sustainability must be ensured (ibid.). Second, universal human rights cannot be compromised, and promoting health and wellbeing for all is pivotal (ibid.). Third, the purpose of economy is to ensure efficient distribution of goods in a way that everyone's basic needs are fulfilled (ibid.). Moreover, all these areas of SD continuously interact with each other and are interdependent (ibid.). In EAW, human relationships and social harmony are proposed as the basis for wellbeing and happiness instead of the prevailing materialistic and individualist values (Salonen & Konkka, 2015, p. 26). The EAW model has been applied in ESD discursion in Finland and it is promoted in the Finnish National Core Curricula for Early Childhood Education and Basic Education (Finnish National Agency for Education, 2016, p. 19-20; Finnish National Agency for Education, 2014, p. 16).

Lozano (2008) views common visual representations of SD too simple to provide a sufficient image of the interactions and dynamics concerning SD (p. 1845). His three-dimensional model of sustainability, the 'Two Tiered Sustainability Equilibria' (*Figure 4*), regards the three pillars of SD equally relevant and continuously interacting with each others and phenomena under each of the aspects (Lozano, 2008, pp. 1843-1844). Moreover, Lozano (2008) adds a timely dimension to the model (p. 1844).

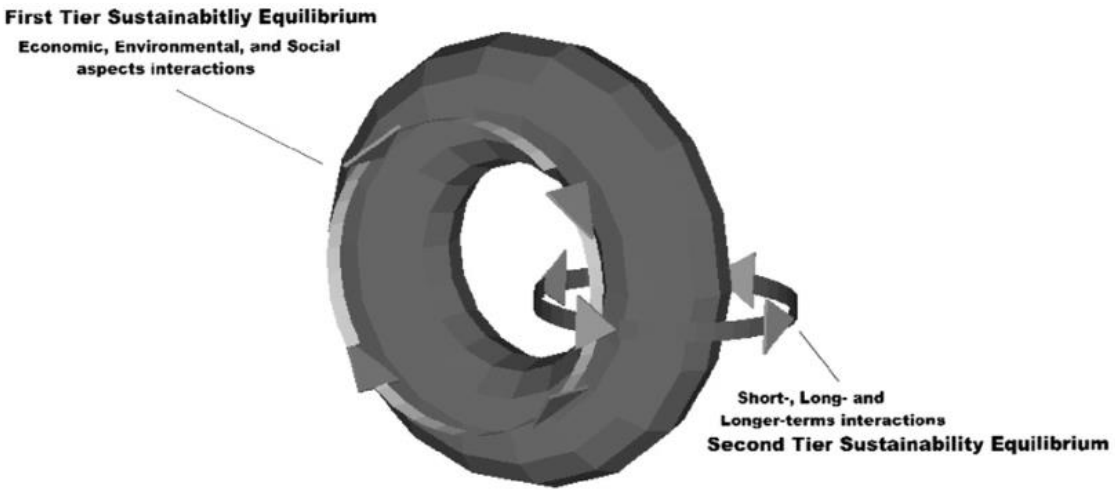

Figure 4. 'Two Tiered Sustainability Equilibria' (Lozano, 2008, p. 1844).

Even though slightly different in their emphases, the introduced three models provide a rather unified perception of SD by emphasising interdependencies and a systemic understanding of SD. However, outside academia, the interpretations of and importance given to SD vary enormously (Hopwood et. al., 2005, p. 40). Hopwood's et. al. (2005) axis model (*Figure 5*) presents environmental sustainability on one axis and socio-economic issues on another one (p. 41). Their mapping provides an illustration of how the same terminology can be used to pursue vastly differing outcomes. Also, these examples' value positions vary significantly from anthropocentric and technocentric perceptions to ecocentrism and deep ecology.

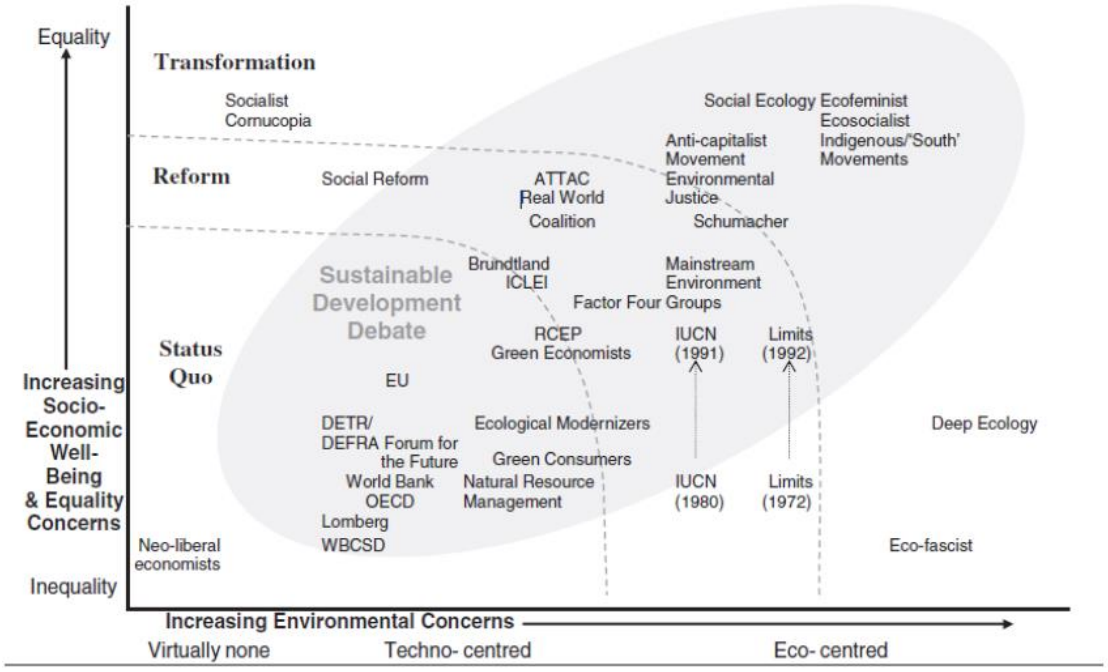

Figure 5. Mapping of Views on Sustainable Development (Hopwood et. al., 2005, p. 41).

Environmental ethics add an important layer to SD discursion, and Barau, Stringer and Adamu (2016) argue that involving environmental ethics in the endeavour of searching for sustainable solutions can mobilise different stakeholders and support mainstreaming sustainability transformations (pp. 1545-1546). Therefore, some positions in environmental ethics are introduced next. The typology of environmental ethics is broad and nuanced but the fundamental question concerns humans' relationship with the environment (Cochrane, n.d., n.p.; Palmer, McShane & Sandler 2014, p. 420).

In the anthropocentric view, humans are regarded as the only species whose value is intrinsic the other species having only instrumental value (Palmer et. al., 2014, p. 423). Some alternative ethical positions argue that also other living things (biocentrism) or whole ecosystems (ecocentrism) have intrinsic value (Palmer et. al., 2014, pp. 426-427). In environmental ethics, arguments about environmental problems' roots being in the athropocentric views of human dominance over nature have been prevalent (Palmer et. al., 2014, p. 423). However, Mebratu (1998) argues that "one cannot be ecocentric without being anthropocentric first" (p. 516). In Curry's (2006) typology of light-green, mid-green and dark-green environmental ethics, all stances represent anthropocentrism but the degree to what extent differs depending on the position. Referring to the Brundtland definition of SD, the goal of SD is to adapt human life to the limitations of Earth in a way that next human generations can also live and survive on the Earth (Kopnina, 2012; Risku-Norja, 2012, p. 12). Thus, SD itself can be regarded as an inherently anthropocentric concept (Kopnina, 2012; Risku-Norja, 2012, p. 12).

Apart from the above-mentioned ethical stances, traditional ethical theories, such as deontology, consequentialism and virtue ethics are also relevant in SD discursion by introducing different ways of reasoning what is good and favourable (Nilsen, 2010, p. 497; Palmer et. al., 2014, pp. 430-432). Technocentrism is another ethical position often discussed in relation to SD, which is characterised by regarding technological innovations as main means for sustainability transformations (Sterling, 1996, pp. 32-33). Environmental justice, on the other hand, calls for just ways of distributing both environmental benefits and burdens, yet currently the ones who already are in a vulnerable state tend to face the worst consequences of unsustainability (Des Jardins, 2006, pp. 226, 231). As seen in Hopwood's et. al. (2005) axis model, there are also several other environmental ethics movements that underlie actions taken by different groups, such as ecofeminism, ecofascism and deep ecology (p. 41). However, they are not further discussed here.

Although being an integral part of solutions that can guide the world onto a more sustainable path, Mebratu (1998) emphasises that ethics cannot be the main "means to the end" (p. 515). Therefore, ethical contemplations should not overly dominate the SD discussion (Mebratu, 1998, pp. 515-516). Furthermore, Mebratu (1998) stresses that a vision without any concrete shared understanding of what SD is or a scientific theory base cannot provide sufficient solutions to the issues of unsustainability (pp. 515-517). Recently, a new UN agenda for international development was launched introducing 17 SDGs (UN, 2015). The SDGs provide a more tangible, holistic and integrated agenda for SD than any previous development agendas (Blanc, 2015, p. 9). Yet, they have been criticised for being overly anthropocentric (Kopnina, 2017, p. 6). Moreover, some of the Agenda's goals and targets are perceived as contradictory, and stressing the significance of economic growth in reaching the goals may lead to continuing in the current, inherently unsustainable path (Brissett & Mitter, 2017, p. 201; Gupta and Vegelin, 2016, p. 440; Kopnina, 2017, p. 2). Furthermore, not all relevant links between the SDGs are made explicit in the agenda (Blanc, 2015, p. 14).

Despite all the criticism and flaws, the Agenda2030 is a globally shared vision, which is to be endorsed by all nations (UN, 2015, n.p.). As a shared vision for SD is urgently needed (Mebratu, 1998, pp. 515-517), it is reasonable to assume that while recognising its deficiencies, the common benchmarks for SD are presented in the Agenda2030. Even though it only reaches until 2030 and is thus a very short-term agenda for SD, the scientific community seems to agree that for avoiding the gloomiest consequences of the current unsustainable state of the world, decisions and actions taken during the next few years are determinative (IPCC, 2018, p. 17; WWF, 2018, p. 8). To enable integrated decision-making on sustainable development, it is crucial that the SDGs are regarded as a whole rather than as separate goals (Blanc, 2015, p. 9).

3 Sustainable Behaviour and its Determinants

In this chapter, several reviews and empirical case studies are examined in order to understand sustainable behaviour. In particular, demographic, internal and external factors, which anticipate sustainable behaviour, are explored. Furthermore, the second sub-chapter elaborates on childhood experiences and how they influence sustainable behaviour.

3.1 Demographic, Internal and External Factors Influencing Individuals' Behaviour

As discussed, SD is an ambiguous concept and there are many uncertainties concerning what is sustainable and what is not (Wals & Lenglet, 2016, p. 52). Therefore, an archetype for sustainable lifestyle cannot be established. Sustainable behaviour encompasses both pro-environmental and pro-social behaviour, however, pro-environmental behaviour and sustainable behaviour are often used interchangeably (Tapia-Fonllem, Corral-Verdugo, Fraijo-Sing & Durón-Ramos, 2013, p. 712). Drawing on previous research, Tapia-Fonllem et. al. (2013) propose that sustainable behaviour is deliberate, solution-oriented and anticipatory (p. 712), although sometimes goals that are non-related to sustainability may also result in sustainable behaviour (Gifford & Nilsson, 2014, p. 141). Moreover, pro-ecological, frugal, altruistic and equitable behaviours are all elements of sustainable behaviour (Tapia-Fonllem et. al., p. 720). Commitment to sustainable behaviour is a complex sum of multiple factors and cannot be fully disclosed in the light of current research (Gifford & Nilsson, 2014, p. 141; Kollmuss & Agyeman, 2002, p. 239). Even though there is a connection between tendencies to act in a pro-environmental and pro-social manner (Salonen & Bardy, 2017, p. 8; Tapia-Fonllem et. al., 2013, p. 720), sustainable behaviour in one situation does not automatically imply acting consistently in another situation (Roczen, Kaiser, Bogner & Wilson, 2014, p. 976). This further complicates evaluating incentives for sustainable behaviour (ibid.).

Nevertheless, a lot of empirical research has been conducted with the intention to understand pro-environmental and sustainable behaviour, and there are several systematic reviews that draw on these results aiming to provide a model for sustainable or pro-environmental behavior and their antecedents (e.g. Gifford & Nilsson, 2014; Kollmuss & Agyeman, 2002; Tapia-Fonnlem et. al., 2013; Varela-Candamio, Novo-Corti & García-Álvarez, 2018). The theory of planned behavior, norm activation theory, and values-beliefs-norms theory are often utilised

in literature to elucidate pro-environmental behaviour (Sawitri, Hadiyanto & Hadi, 2015, p. 27). Pro-environmental behaviour can also be approached from the perspective of social-cognitive theory (Sawitri et. al., 2015). Kollmuss and Agyeman (2002) investigate several prominent frameworks concerning pro-environmental behaviour and conclude that demographic, internal and external factors all have an impact on pro-environmental behaviour (p. 239).

In regard to demographic factors, older people, women, and people who live in rural areas or in larger households tend to behave more pro-environmentally (Gifford & Nilsson, 2014, p. 141; Meyer, 2015, p. 114; Otto & Kaiser, 2014; Vicente-Molina, Fernández-Sáinz & Izagirre-Olaizola, 2013, p. 136). Disabled and retired people also display more pro-environmental behaviours perhaps due to having more discretionary time (Meyer, 2015, p. 114), which is detected to influence sustainable consumption patterns in a study conducted in Australia (Chai, Bradley & Reser, 2015, p. 105). There are studies which support the notion that learning and education enhance pro-environmental behaviour (Meyer, 2015; Otto & Kaiser, 2014; Vicente-Molina et. al., 2013; Welsch & Kühling, 2010). Based on an analysis of two Eurobarometer surveys and by contrasting the data with educational reforms executed in Europe, Meyer (2015) argues that education has a causal effect on increased pro-environmental behaviour (p. 116). Post and Meng's (2018) analysis of the World Value Survey's results with data from 50 countries confirms that the higher level of education, the more likely participants report commitment to pro-environmental behaviour (p. 16).

However, there are some factors that hinder the effectiveness of raising environmental awareness through cognitive and abstract learning: destructive environmental changes are not easily perceived, the problems are very complex, and the negative consequences often appear with a delay (Kollmuss & Agyeman, 2002, pp. 253-254). Furthermore, more education is associated with higher income (Meyer, 2015, p. 116). Economic wealth can either encourage or discourage pro-environmental behaviour depending on the situation (Gadenne, Sharma, Kerr & Smith, 2011, p. 7684; Otto, Neaman, Richards & Marió, 2016, p. 631), yet people with higher income generally consume more (Bengtsson et. al, 2018, p. 58).

Concerning internal factors, research reveals several variables that are connected to pro-environmental behaviour. Some personality traits, such as agreeableness, conscientiousness, openness and extraversion correlate with voluntarily pro-environmental behaviour (Terrier,

Kim & Fernandez, 2016). Emotions also influence it (Kollmuss & Agyeman, 2002, p. 254; Tapia-Fonnlem et. al., 2013, p. 714). When confronting something negative, complex or worrisome, people tend to exhibit defense mechanisms such as denial or apathy, which, in the case of severe sustainability problems, stop them from acting or searching for solutions (Coelho, Pereira, Cruz, Simoes & Barata, 2017, p. 133; Kollmuss & Agyeman, 2002, p. 257). Positive affect, in other words personal evaluation of positive emotions such as joy and enthusiasm, diminishes this effect (Coelho et. al., 2017, pp. 128, 133). On the other hand, negative emotions, such as indignation due to ecological destruction, may also elicit sustainable behaviour (Tapia-Fonnlem et. al., 2013, p. 714).

In particular, positive emotions towards nature play a role in explaining commitment to sustainable behaviour (Kollmuss & Agyeman, 2002, p. 254; Martin & Czellar, 2017, p. 65, Restall & Conrad, 2015, p. 273; Otto & Pensini, 2017, p. 93; Roczen et. al., 2014, p. 986). Martin and Czellar (2017) conducted several studies in the United States and Europe with adult and student participants and conclude that connectedness to nature correlates with biospheric values, which, in turn, are related to sustainable behaviour (p. 65). In Roczen's et. al. (2014) study with German secondary school students, attitude towards nature explains ecological behaviour more than environmental knowledge (p. 986). Similar results are found also in Otto and Pensini's (2017) research with primary school children, which studies the impact of a nature-based environmental education programme (p. 93). Environmental awareness seems to have only a moderate effect on sustainable behaviour (Wals, 2011, p. 179), however, having basic knowledge is essential for being able to choose and create sustainable alternatives and solutions (Gifford & Nilsson, 2014, p. 142; Kollmuss & Agyeman, 2002, p. 250). Furthermore, even though attitudes and sustainable behaviour are linked, attitudes do not directly shape people's behaviours (Gifford & Nilsson, 2014, p. 141; Kollmuss & Agyeman, 2002, pp. 239, 242, 252; Varela-Candamio et. al., 2018, p. 1573; Vicente-Molina et. al., 2013, pp. 135-136).

Motivation, a sense of self-efficacy, and perceived responsibility are also essential elements of sustainable behaviour (Gifford & Nilsson, 2014, p. 141; Kollmuss & Agyeman, 2002, p. 239; Varela-Candamio et. al., 2018, p. 1573). In regard to motivation, especially altruistic and intrinsic motivations, which are influenced by values, seem to anticipate commitment to sustainable behaviour (Kollmuss & Agyeman, 2002, p. 251; Tabernero & Hernández, 2011; Tapia-Fonllem et. al., 2013, p. 720; Vicente-Molina et. al., 2013, pp. 135-136). Feeling capa-

ble of having a positive impact is crucial for being motivated to act in pro-environmental and pro-social manners (Sawitri et. al., 2015, p. 31; Schutte & Bhullar, 2017, p. 321; Tabernero & Hernández, 2011, p. 658; Vicente-Molina et. al., 2013, pp. 135-136). Self-efficacy, motivation to act sustainably and perceived self-control are significantly related to self-reported sustainable behaviours in Schutte and Bhullar's (2017) case study with adult participants from Australia and the United States (p. 326). In Juárez-Nájera, Rivera-Martínez & Hafkamp's (2010) case study with a German and a Mexican higher education institution, ascribed responsibility is identified as one of the most significant factors that explains sustainable behaviour (p. 690).

Moreover, a strong environmental self-identity is connected to sustainable behaviour (Carfora, Caso, Sparks & Conner, 2017, p. 97), which may be due to a sense of moral obligation to act sustainably (Werff, Steg & Keizer, 2013, p. 1263). Yet, even people with strongest environmental self-image do not necessarily act pro-environmentally in all occasions (Binder & Blankenberg, 2017, p. 320). Indeed, it is typical that people's behaviours demonstrate a value-action, attitude-action, concern-action, or knowledge-action gap (Binder & Blankenberg, 2017, p. 320; Salonen & Åhlberg, 2012, pp. 15, 20; Tam & Chan, 2017, p. 221; Velasco & Harder, 2014, p. 6570). Acting against what is known to be 'good' is typical when people do not feel a personal sense of responsibility (Nussbaum, 2010, p. 43). Therefore, Salonen & Bardy (2017) propose that global and intergenerational responsibilities are some of the main components of sustainable behaviour, which should be endorsed through education (p. 8).

However, both the individual and the situation influence decision-making and determine what kinds of actions are taken (Nussbaum, 2010, p. 43; Sawitri et. al., 2015, p. 31). Usually, the easier and the more convenient the pro-environmental action is, the more likely people commit it (Kollmuss & Agyeman, 2002, p. 252; Vicente-Molina et. al., 2013, pp. 135-136). There are several external factors that influence individual's sustainable behaviour, including institutional, social, cultural and political norms and practices (Gadenne et. al., 2011, p. 7684; Gifford & Nilsson, 2014, p. 141; Kollmuss & Agyeman, 2002, p. 239; Varela-Candamio et. al., 2018, p. 1573). Countries where "distrust, belief in external control, and present orientation" are prevailing phenomena, people tend to demonstrate less pro-environmental behaviours regardless of their level of environmental concern (Tam & Chan, 2017, p. 213). Vicente-Molina et. al. (2013) compare pro-environmental behaviour in emerging and developing countries the results confirming that people behave differently due to cultural and structural

differences (p. 130). Yet, no country displays pro-environmental behaviour in all studied sectors, which suggests a need for improving contextual factors both in emerging and developed countries (Vicente-Molina et. al., 2013, p. 136). Indeed, it is crucial that contextual factors support making sustainable choices, otherwise sustainable values, attitudes and knowledge may not translate into sustainable behaviour (Salonen & Åhlberg, 2012, pp. 15, 20; Velasco & Harder, 2014, p. 6570). As Varela-Candamio et. al. (2018) state, pro-environmental behaviour is a "shared responsibility of public authorities, citizens, and industry" (p. 1573).

3.2 Childhood and Sustainable Behaviour

As discussed, human behaviour is shaped both by genetic factors, the environment, and internal factors such as values and attidues (Schunk, 2012, pp. 4, 22). Behaviours form and change through learning, which can be defined as "an enduring change in behavior, or in the capacity to behave in a given fashion, which results from practice or other forms of experience" (Schunk, 2012, p. 3). Socialisation is the process through which people learn to behave in a socially acceptable way and develop their morality (Leidy & Parke, 2015, p. 866; Schunk, 2012, p. 258). Leidy and Parke (2015) define socialisation as following: "socialisation is the process by which children acquire the values, standards of behavior, attitudes, and skills that are viewed as appropriate to the culture in which the child resides" (p. 866). Families play an important role in children's socialisation but also other significant actors, such as school and teachers, peer groups, media and the surrounding society influence the socialisation process (Leidy & Parke, 2015, p. 866; Nussbaum, 2010, pp. 38-39, 44-45; Schunk, 2012, p. 258).

Childhood is a crucial time period for the development of sustainable behaviours (Chawla, 1999, p. 21; Davies et. al., 2009; Evans, Otto & Kaiser, 2018, p. 684; Kos et. al., 2016, p. 5554). Respect towards oneself, others and the environment, as well as the basics of critical thinking are learnt during early childhood (Davies et. al., 2009, p. 113). Already at the age of 3, children can evaluate and morally judge harm done to the environment and to other people (Hahn & Garrett, 2017, p. 17). Moreover, through appropriate instruction, 5-6-year-old children can accurately understand the scientific reasoning behind a pro-environmental behaviour (Kos et. al., 2016, p. 5569). Nevertheless, it seems that the older the children are, the better their actions correspond with their sustainability attitudes (Collado, Evans & Sorrel, 2017, p. 33).

Toddlers exhibit a large range of pro-social behaviours but also early forms of discrimination are detectable in groups of young children (Over, 2018, p. 17). Family's influence and the child-parent relationship are pivotal for the development of pro-social behaviours (Leidy & Parke, 2015, p. 869; Spinrad & Gal, 2018, pp. 41-42). However, also group membership and social norms have an impact on the behaviours that children adopt (Over, 2018, p. 18). Family and the values they hold also seem to be influential factors that explain environmental activism (ibid.). Evans' et. al. (2018) findings from a longitudinal study support these results. In their research, children were studied over a period of 12 years (starting at the age of 6), and the main predictors for pro-environmental behaviour as young adults include time spent outdoors as a child (which is detected to have a major impact on environmental concern later in life also in Chawla's (1990) retrospective research on environmental activists' life experiences), maternal education, and maternal pro-environmental behaviours and attitudes (Evans et. al., 2018, p. 684). However, according to Collado's et. al. (2017) study with 9-13-year-old children, it seems that indeed parental pro-environmental behaviour rather than their attitudes influence children's pro-environmental behaviour (p. 34).

However, the importance of education and schools for fostering sustainable behaviour should not be undermined, and quality education accessible for all is crucial for attaining any of the SDGs (Bengtsson et. al., 2018, p. 161). Nussbaum (2010) illustrates the interplay between families and education as following:

> Schools are but one influence on the growing mind and heart of the child. Much of the work of overcoming narcissism and developing concern has to be done in families; and relationships in the peer culture also play a powerful role. Schools, however, can either reinforce or undermine the achievements of the family, good and bad. They can also shape the peer culture. What they provide, through their curricular content and their pedagogy, can greatly affect the developing child's mind. (Nussbaum, 2010, pp. 44-45)

During adolescence and early adulthood, parents' influence on sustainable behaviour decreases and peers and education become more influential (Collado et. al., 2017, p. 34; Chawla, 1998, p. 21). However, Olsson and Gericke (2016) notice that Swedish adolescents display less sustainability-related knowledge and sustainable attitudes and behaviours than younger children (Olsson & Gericke, 2016, p. 44). Furthermore, assessing the impact that a short envi-

ronmental education programme has on children at different ages, Liefländer and Bogner (2014) conclude that environmental education might be more influential and easier to implement with younger children (p. 114). As Samuelsson (2011) states, "the foundations for knowledge construction as well as for attitudes and values are established in the early years" (p. 115). Even though socialisation is an on-going process and learning occurs and changes behaviours throughout life, reinforcing sustainable behaviour from an early age on is easier than trying to change existing non-sustainable behaviour patterns later in life (Samuelsson, 2011, p. 115). Thus, it is crucial that education supports learning for sustainability from early childhood education on (Macdonald, 2015, p. 333; Samuelsson, 2011, p. 115).

4 Education for Sustainable Development

In literature, there are several perceptions about what ESD is, how it can and should be implemented, and what kinds of learning theories and pedagogical approaches are helpful in ESD. In this chapter, ESD is first examined in the light of a dichotomy that several academics have communicated concerning its nature. Second, some learning theories and pedagogical approaches, which regularly seem to appear in ESD literature, namely critical pedagogy, experiential and outdoor learning, action competence and place-based education, transformative learning, and social learning are further elaborated on. However, due to the restraints in ESD research (see Ardoin et. al., 2018; O'Flaherty & Liddy, 2018; Stern et. al., 2014), the conclusions in this chapter draw largely on theoretical and philosophical literature, yet some empirical studies are also referred to.

4.1 Defining Education for Sustainable Development

Learning and education can occur either in formal, non-formal or informal settings. Drawing on Tudor's (2013) definition of different forms of learning, formal education, including compulsory education, provides institutional learning with an established syllabus and formal forms of assessment leading to achieving a certificate (p. 822). Non-formal education takes place outside formal education systems and can be provided by for example community organisations, libraries or music schools (ibid.). Like formal learning, non-formal learning is intentional and the activities are organised mainly for learning purposes (ibid.). Informal learning, on the other hand, is not structured learning but usually occurs unintentionally while engaging in everyday activities (ibid.; see Barth et. al., 2017, p. 814).

As concluded in the previous chapter, there is a link between education and sustainable behaviour, and education can foster learning for sustainability. Several UN agendas and initiatives stress education's role in advancing SD (e.g. Agenda 21, UN, 1992; Decade of Education for Sustainable Development 2005-2014, UN, 2005; Agenda2030, UN, 2015; Learning for Sustainable Development Goals – Learning Objectives, UNESCO, 2017). Nevertheless, how to unleash this potential in an influential and ethical way is a question several scholars have attempted to answer. Wals (2011) is critical towards perceiving education as a tool for a prescribed behaviour change "because doing so contradicts the essence of education" (pp.

178-179). This perception suggests that education has mainly instrumental value, which concretises when utilised for pursuing other goals (Bengtsson et. al., 2018, p. 19; Sterling, 2011a, p. 25; Wals, 2011, p. 178). On the contrary, according to the intrinsic view, education's value is not dependent on the consequences it may result in but education itself is inherently valuable (Bengtsson et. al., 2018, p. 19; Sterling, 2011a, p. 25).

Generally, education has at least four functions: socialisation, vocational, liberal and transformative functions (Sterling, 2011a, p. 25). The first two reflect mainly instrumental views whereas the liberal approach is more concerned about the intrinsic value of education by aiming to help individuals to achieve their fullest potential (Sterling, 2011a, pp. 25-26). The transformative function of education is both instrumental and intrinsic as it recognises that education can support "change for the better" but uses methods, which incline towards intrinsic education (Sterling, 2011a, p. 26). Bengtsson et. al. (2018) argue that pursuing education "on its own terms" is crucial, and generic 'good' education rather than educational interventions with specific goals facilitates achieving the SDGs (pp. 19, 162). However, as many prevailing education systems are criticised for being outdated and for reinforcing neoliberal values and unsustainable behaviour patterns (Hofman, 2015, p. 223; O'Brien & Howard, 2016; Sterling, 1996, p. 18; UNESCO, 2016, pp. 11, 162; Villanen, 2014, p. 19), how to implement education that fosters SD instead of impeding it is a crucial question (Brissett & Mitter, 2017, p. 201). Sterling (2011a) argues that all four functions of education should be present in education systems (p. 26). However, if education is to help learners to achieve their fullest potential while ensuring SD and peace, the liberal as well as transformative purposes must be placed more emphasis on (ibid.). According to Sterling's (2011a) educational paradigm, "education is about nurturing and realizing inherent potential, *but also* is acutely aware that we need to educate for sustainability, community and peace in a turbulent and rapidly changing world" (p. 26).

ESD is an internationally promoted educational construct, which "empowers learners to take informed decisions and responsible actions for environmental integrity, economic viability and a just society for present and future generations" (UNESCO, 2017, p. 7). According to UNESCO (2017), ESD is inseparable from quality education, and formal, informal and non-formal educational sectors as well as all educational stages should support learning for sustainability (p. 7). However, despite being a more and more elaborated concept, there is no

unanimous answer to what ESD is and what kinds of issues it addresses (Hofman, 2015, p. 214; Mogensen & Schnack, 2010, p. 62).

As Brissett and Mitter (2017) propose, in order to support the change indicated in the SDGs, education must place "issues of social and ecological justice at the heart of its objectives" (p. 201). Furthermore, it is crucial that learners understand the interactions and interdependencies between humans, environment and economics and are able to perceive the world and its phenomena in a systemic way (Capra & Luisi, 2014, p. xi; Salonen & Bardy, 2015, pp. 7-8). According to Salonen and Bardy's (2015) Ecosocial Approach to Education, responsibility (planetary and interpersonal), sufficiency (in terms of consumption and lifestyle choices), and participation (fostering collectivism, empathy, altruism and positive relationships with diverse people) are crucial aspects of education that helps to build a more sustainable world and ensure wellbeing for all (pp. 8-10). Nevertheless, a detailed and exhaustive universal curriculum for ESD cannot be established as a sustainable way of living is subject to time and location and sometimes unknown (Hofman, 2015, p. 214; Sterling, 1996, p. 144; Wals, 2011, p. 179). Thus, ESD must be contextual, address both local and global sustainability problems, take into account the plurality of cultures and worldviews, and consider also traditional and minority knowledge (Hofman, 2015, pp. 214, 224; Nasibulina, 2015, p. 1078; Risku-Norja, 2012, p. 13).

Several scholars describe a dichotomy concerning the nature and fundamental purpose of ESD. Sterling (2010) suggests that in the instrumental view of ESD, SD is regarded as a tangible goal that can be achieved through effective learning and prescribed learning outcomes (pp. 513-514). Intrinsic approach, on the other hand, focuses on the process of learning and creating quality learning situations (Sterling, 2010, pp. 513-514). Rather than aspiring to generate specific outcomes, the goal in the intrinsic ESD is to help learners to develop their independent and critical thinking skills as well as their adaptive capacity (ibid.).

Sterling's (2010) intrinsic and instrumental approaches are similar to Wals' (2011) instrumental and emancipatory views of ESD, Vare and Scott's (2007) ESD1 and ESD2, and Poeck and Vandenabeele's (2012) learning *for* sustainable development and learning *from* sustainable development. In ESD2, SD itself is regarded as a continuous learning process with no end point because what is sustainable changes constantly (Vare & Scott, 2007, p. 194). Rather than knowing the "correct" way of behaving now, people need to be capable of dealing with

uncertainties and keep searching for better alternatives (ibid.). Wals (2011) adds that participatory, collaborative and dialogic processes are an essential part of SD, and emancipatory ESD fosters the competencies needed for engaging in these (pp. 179-180). These intrinsic and emancipatory views of ESD, which "acknowledge complexity, respectful dissensus, value conflicts, and uncertainty in the process of learning about sustainable development" can also be called pluralistic approaches to ESD (Ojala, 2013, p. 3).

In current research, education is mostly perceived to facilitate SD through developing learners' capabilities and competencies (Bengtsson et. al., 2018, p. 13; Gokool-Ramdoo & Rumjaun, 2017, p. 77). Hedefalk et. al. (2015) review research articles (published between 1996 and 2013) about ESD in Early Childhood Education and identify a shift from fact-based sustainability education to ESD which bolsters children's agency and action competence (p. 975). UNESCO (2017) also promotes key competencies relevant for enabling the realisation of SDGs. These encompass behavioural and strategic competencies, which facilitate taking action and finding viable solution to sustainability problems in collaboration with diverse people; cognitive competencies with a special focus on critical, systems and futures thinking; ethical and reflective competencies, which include critical contemplation of values, norms and personal choices; and affective competencies, i.e. understanding and processing own feelings as well as developing empathy and sensitivity towards others (UNESCO, 2017, p. 10). These are to be developed in an age-appropriate way following the principles of life-long learning, of which importance is elaborated on in SDG4 (UNESCO, 2017, p. 10; UN, 2015, n.p.).

Nevertheless, ESD approaches that aim to foster sustainability through developing individual's capacities are based on an anticipation that educated individuals want to embrace sustainability in their lives and voluntarily enact sustainable behaviours (Hofman, 2015, p. 218; Wals, 2011, p. 180). Kopnina (2012) is concerned about these approaches and argues that they may distract educators and learners from addressing the urgent need to stop the destructive global environmental change, which threatens the existence of the human kind (p. 712). Yet, according to Wals (2011), the sense of urgency does not justify instrumental education, which could in fact lead to poorer learning outcomes in regard to sustainability action (p. 178). Based on findings from two quantitative studies with Swedish primary and secondary pupils, Olsson & Gericke (2016) and Olsson, Gericke and Chan Rungden (2015) suggest that traditional transmissive teaching methods and instrumental view of ESD are insufficient for increasing children and adolescents' sustainability consciousness (knowingness, attitudes and

behaviour in regard to SD) and call for adopting methods that are consistent with the intrinsic and emancipatory views of ESD. However, Sterling (2010) concludes that only if these both approaches to ESD are reconciled, ESD can effectively respond to the severe planetary crises (p. 525; see Vare & Scott, 2007, p. 191). Accepting the urgency and a need for behaviour change while boosting learners' resilience, participation, collaboration, competencies, creativity and critical and systemic thinking skills is central in ESD (Sterling, 2010, p. 522).

All in all, ESD is an ambiguous concept and there are some tensions concerning its fundamental nature whether it being more intrinsic or instrumental. However, it seems that currently, quality ESD is considered to be a combination of relevant and contextual learning contents that promote competencies necessary for SD and for helping people to cope in today's rapidly changing world; appropriate pedagogical solutions; social and collaborative learning with multiple stakeholders; and a holistic and integrated way of viewing and interpreting the world (Ofei-Manu & Didham, 2018, pp. 1179-1181; see Sterling, 2011a; UNESCO, 2017, p. 7). Even though it has some instrumental characteristics, it is not a separate learning intervention but can be perceived as an element, which underlies all education (Gokool-Ramdoo & Rumjaun, 2017, p. 79; Hicks, 2014; MacDonald, 2015; Orr, 2004; Sterling, 2011a; UNESCO, 2017).

4.2 Learning Theories and Pedagogical Approaches in ESD

Pedagogy can be defined as "the interactions between teachers, students and the learning environment and learning tasks" (Murphy, 2008, p. 35). Several pedagogical approaches are useful when implementing ESD. However, it seems that most traditional teacher-centred and fact-based methods cannot respond effectively to the complex nature and various learning targets of ESD (e.g. Hedefalk et. al., 2015, p. 985; Olsson et. al., 2015, p. 195; see UNESCO, 2017, p. 7). According to UNESCO (2012), there has been a shift towards more progressive and transformative pedagogies in ESD (pp. 27-28, *Figure 6*). Based on a questionnaire, most common methods for implementing ESD in different institutions in 102 countries are participatory, problem-based, interdisciplinary and critical thinking-based learning methods (UNESCO, 2012, p. 28). Many respondents pointed out that chosen learning activities are influenced by the group and their needs as well as by contextual factors, and ESD is often a combination of several teaching and learning methods (UNESCO, 2012, p. 28).

There are various other listings of pedagogical approaches typical in ESD. For example, Ofei-Manu and Didham (2018) identify "experiential learning theory, critical theory, critical praxis/pedagogy, problem-based learning, social learning, communities of practice, collaborative learning theory and cooperative inquiry, constructivism, systems thinking, integrative theory, and transformative learning" to be valid pedagogies (p. 1176). Wals (2011) states that "a whole range of forms of learning is emerging: transdisciplinary learning, transformative learning, anticipatory learning, collaborative learning and, indeed, social learning are just a few of those" (p. 180). All in all, it seems that learner-centred, collaborative methods that draw on critical and transformative pedagogy and support learners' agency are relevant in ESD (e.g. Mogensen & Schnack, 2010; Ofei-Manu & Didham, 2018, p. 1176; UNESCO, 2017, p. 7; Wals, 2011, p. 180). Also, experiential learning in real-life contexts and nature-based activities are conducive to eliciting action competence and sustainable behaviour (e.g. O'Brien & Howard, 2016, p. 118, Otto & Pensini, 2017, p. 93; Villanen, 2014). Some approaches and educational theories that seem to be largely discussed in ESD literature are elaborated on next. They are presented in separate sub-chapters but it is important to note that they share many characteristics and are partly overlapping.

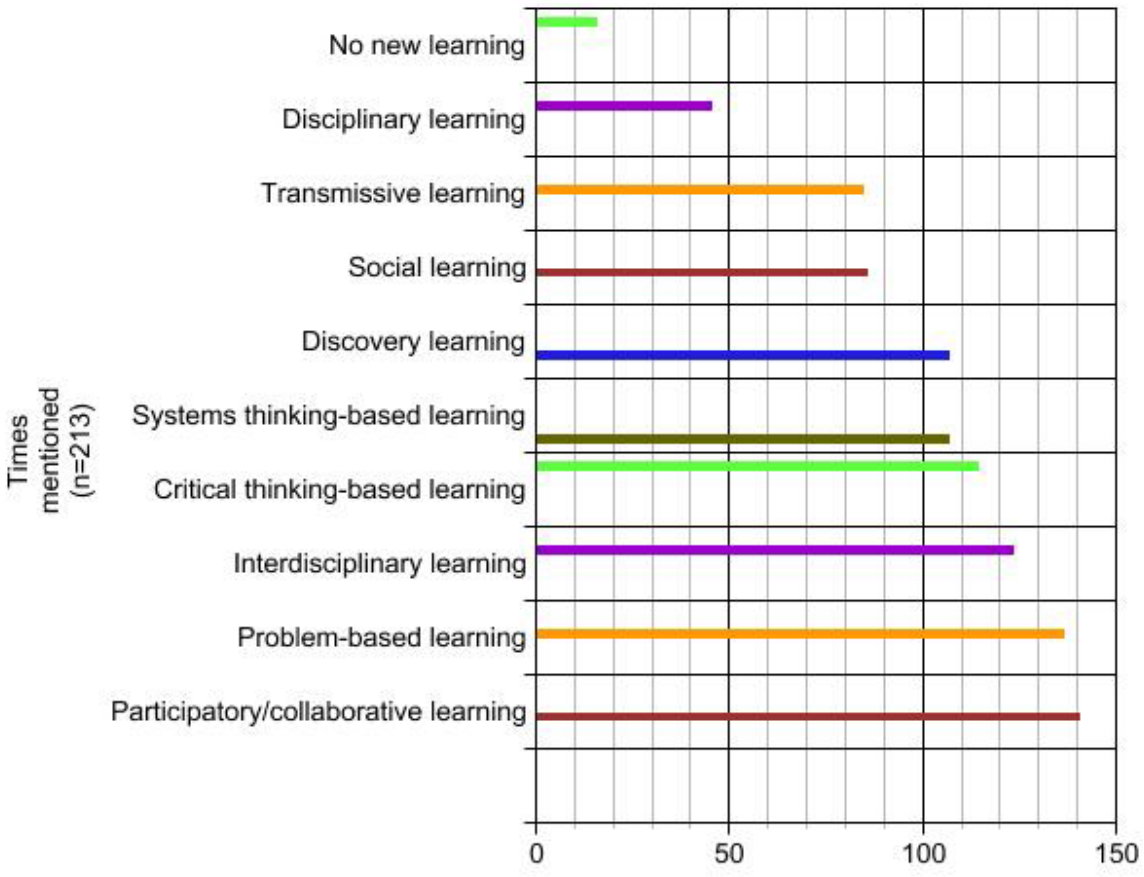

Figure 6. Pedagogies in ESD (UNESCO, 2012, p. 28).

4.2.1 Critical Pedagogy

Critical pedagogy is an educational philosophy that draws on the work of Paulo Freire. Critical pedagogy empowers and liberates learners to be conscious critical thinkers who are aware of social injustices and unequal power structures and act upon them (Freire, 1996, p. 81). The roots of the current environmentally destructive development are largely structural (Wildemeersch, 2017, p. 5). Brantmeier (2013) argues that in addition to power dynamics between humans, different groups, societies and nations, considering nature as an object and humans as separate from it creates imbalanced power structures between humans and nature (p. 248). In critical pedagogy, prevailing values, norms and power structures are critically examined and more just and sustainable alternatives are seeked for (Freire, 1996, p. 92; Huckle, 1996, p. 106; Paulus, 2016, p. 119). Hence, critical pedagogy is necessary for ESD, which empowers learners to think systemically, recognise the dominant socially and ecologically unsustainable patterns and structures, and take action for SD (Freire, 1996, p. 83; Gokool-Ramdoo & Rumjaun, 2017, p. 77; Paulus, 2016, p. 119).

Critical pedagogy is also concerned about what education is for and how it is implemented (Gokool-Ramdoo & Rumjaun, 2017, p. 73; Paulus, 2016, p. 119). Freire (1996) contests the "banking" concept of education, which he describes as "an act of depositing, in which the students are the depositories and the teacher is the depositor" (p. 72). Instead of teachers transmitting knowledge that students passively assimilate, Freire (1996) calls for equal relationships between teachers and students, mutual inquiry about the world, and learners' activity in the learning process (pp. 80, 83). Wildemeersch (2017) suggests that critical pedagogy that supports ESD can be defined "as the joint shaping of a (public) space, in which both teacher and student engage in a process of research and experiment, whereby the right outcome of the process is not known on beforehand, but verified when being realized" (p. 5). This aligns with the perception of ESD being ultimately about learning to deal with uncertainties and aspiring to find the best available solutions at the time and place in question (Vare & Scott, 2007, p. 194).

Employing philosopher Hannah Arendt's thoughts, Wildemeersch (2017) discusses the importance of "the presence of others for one's identity development, but also for processes of emancipation and critical thinking" (p. 8). Collaboration with diverse people and encountering pluralistic values are helpful for constructing and re-thinking ideas and thought patterns,

seeing them from multiple perspectives, and for triggering creativity (Hofman, 2015, p. 218; Wals, 2011, pp. 182-183). Moreover, despite their physical locations, people are more and more interconnected, and daily interactions are increasingly heterogeneous (Portera & Grant, 2017, p. ix). Thus, learning to successfully interact and collaborate with people from a variety of cultural backgrounds are both essential and fruitful skills for SD (Hofman, 2015, p. 218; Wals, 2011, pp. 182-183), as well as prerequisites for ensuring functional democracies (Nussbaum, 2010, pp. 77, 80). Furthermore, recognising and opposing hegemonies and culture-related power inequalities are crucial aspects of ESD and SD (Paulus, 2016, p. 120; Polistina, 2009, p. 122; Wals, 2010, p. 147).

In critical pedagogy, dialogue is a central mean for learning and engaging with others (Freire, 1996, pp. 88-89). Dialogue is also regarded as a useful practice in intercultural encounters (Portera, 2017, p. 24). Dialogue is both reflection and action in which equal participants meet and "name the world" as well as engage in transforming it (Freire, 1996, pp. 88-89). It is not a predetermined act but open-ended and aims to finding agreement (Freire, 1996, p. 91; Nussbaum, 2010, p. 51). Furthermore, it is based on mutual respect, care and trust (Freire, 1996, p. 91; Nussbaum, 2010, p. 51). Nussbaum (2010) emphasises that dialogue and learning the skills of Socratic argument are essential in education (pp. 48-50). Without these, students do not learn to think for themselves and tend to form their opinions based on authorities and peer groups (Nussbaum, 2010, p. 50). On the contrary, by encouraging active participation and hearing everyone's voice, people feel more accountable for their opinions (Nussbaum, 2010, p. 54).

4.2.2 Experiential and Outdoor Learning

Experiential learning is a constructivist learning theory influenced by Dewey, Lewin, Piaget and Kolb and associated with areas of psychology such as social, cognitive-developmental, humanistic, and positive psychologies (Mackenzie, Son & Hollenhorst, 2014, pp. 76, 78; Miettinen, 2000, p. 54). It is a learner-centred approach, which emphasises holistic learning, real-life experiences, reflection, and connecting theory and practice (Kolb & Kolb, 2012, n.p.; Miettinen, 2000, p. 54: Nicol, 2014, p. 459). Experiential learning is relevant both in adult education (Miettinen, 2000, p. 54) and when educating children (Kos et. al., 2016. p. 5569; Luff, 2018, p. 448; Macdonald, 2015, p. 336). Miettinen (2000) contemplates that "spontaneity, feeling, and deep individual insights with the possibility of rational thought and reflection"

make experiential learning an appealing approach to adult education (p. 70). Respectively, Kos et. al. (2016) and Macdonald (2015) stress that children are active learners who learn best when experiential and holistic methods are used, thus "experiential learning is at the heart of early childhood education" (Luff, 2018, p. 448). Moreover, according to Reif and Grant (2010), experiential, engaging and participatory methods are often more successful at reaching all learners than traditional transmissive teaching methods.

Simple awareness raising is often unsuccessful in initiating more sustainable behaviours even when the benefits of the new behaviour are well reasoned (Kollmuss & Agyeman, 2002, p. 241). However, when experiencing something directly, the emerged attitudes are more likely to translate into behaviours (Rajecki, 1982, as cited in Kollmuss & Agyeman, 2002, p. 242). Dewey (1957) emphasises the importance of active learning from authentic experiences (pp. 25, 27, 60-61). He regards schools as miniature societies, which should interact with the surrounding society and environments and function in a democratic way (Dewey, 1957, pp. 25, 63, 72-73). When learning is not restricted to school subjects and their boundaries, it becomes more holistic, interdisciplinary and meaningful (Dewey, 1957, pp. 41-42, 55, 86). Since SD is a concept that cannot be pursued in a traditional, disciplinary way and SDGs are inherently interconnected, interdisciplinary learning and fostering systems thinking are paramount in ESD (Annan-Diab & Molinari, 2017, p. 81; Burns, Diamond-Vaught & Bauman, 2015, p. 93; Sterling, 2010, p. 526).

Tarrant and Thiele (2016) argue that Dewey's pragmatic and experiential education paradigms are keystones for the present ESD approaches, and Luff (2018) confirms this notion in Early Childhood Education context (p. 448). Furthermore, Dewey's rationales "provide both a historical antecedent and still valid moral and practical justification for the development of sustainability skills" (Tarrant & Thiele, 2016, p. 63). Jeronen, Palmberg and Yli-Panula's (2016) literature review on biology and sustainability education with primary, secondary, and teacher students encourages adopting these types of experiential, learner-centred methods and learning in real-life contexts (p.13). Also, in the literature that Stern et. al. (2014) synthesise in their systemic review, experiential learning is often considered to account for the success of EE programmes (p. 592).

Experiential learning in nature, in other words outdoor learning, allows learners to "experience the interdisciplinary nature of the real world through interactions with each other and the

planet" (Dolan, 2016, p. 49). As discussed earlier, nature connectedness and positive experiences in nature seem to be significant antecedents for sustainable behaviour (Kollmuss & Agyeman, 2002, p. 254; Collado, Corraliza, Staats & Ruiz, 2015, p. 72; Martin & Czellar, 2017, p. 65; Restall & Conrad, 2015, p. 273; Otto & Pensini, 2017, p. 93; Roczen et. al., 2014, p. 986). For example, in a study with Finnish secondary students, Uitto (2012) discovers a connection between regularly using outdoor spaces as a learning environment and students' nature connectedness and pro-environmental attitudes (p. 175). Furthermore, having a positive nature connection motivates people to learn how to live (ecologically) sustainably (Uitto, 2012, p. 177). Therefore, it is important that learners are immersed in outdoor activities that allow them to connect with nature in a profound way (Burns et. al., 2015, p. 93; Hill & Brown, 2014, p. 217; Navarro-Perez & Tidball, 2012, p. 25).

Outdoor learning can have also several other learning outcomes that are important for fostering sustainability. For example, it can support the development of social and emotional competencies, interpersonal skills, self-esteem, self-efficacy, and cognitive skills (Jeronen et. al., 2016, pp. 9-11; Kaivola, Laaksoharju & Rappe, 2012; Rickinson et. al., 2004, p. 6). Paulus (2016) contends that outdoor learning improves group atmosphere and interaction, which respectively lead to "critical reflection and active participation" (p. 122). Those are crucial in ESD because they allow pluralist and intercultural learning through exchanging personal thoughts and worldviews (Paulus, 2016, p. 122).

However, to make the outdoor experiences impactful, there are several issues to be considered, and the aforementioned benefits of outdoor learning do not result automatically (Leather, 2013, p. 158; Lugg, 2007, p. 106; Rickinson et. al., 2004, p. 6). Design of the experience, group, and pedagogical choices all have an influence on the learning outcomes (Jeronen et. al., 2016, p. 8; McCree, Cutting & Sherwin., 2018, p. 993). Occasional and isolated outdoor experiences without continuity and reflexivity are less effective than regular immersion in nature and expanding on these experiences (Christie, Higgins & McLaughlin, 2013, p. 17; Nicol, 2014, p. 455; Scrutton, 2015, p. 133; Wals, 2010, p. 148). Nature is not only the background in outdoor education but meaningful outdoor activities allow "learning in, about and for nature" (Luff, 2018, p. 450; see Dewey, 1957, pp. 72-73; Nicol, 2014, p. 459; Paulus, 2016, p. 123). Inclusive and participatory activities, getting hands-on experiences of biodiversity and scientific knowledge, engaging in value dialogues, pondering the human-environment relationship, and doing practical work such as gardening are examples of outdoor activities

that can foster learning for sustainability (Kaivola, Laaksoharju & Rappe, 2012; Luff, 2018, pp. 450-451; Nicol, 2014, p. 459; Paulus, 2016, p. 123).

Place-responsive outdoor learning encourages learners to contemplate their role in "ecological, socio-cultural, and political places" as well as the connections and interdependencies between these (Paulus, 2016, p. 124). Furthermore, it facilitates forming a personal connection to a place, which may increase a sense of belonging and ascribed responsibility and elicit a will to care for the surrounding natural, built and social environments (Hill & Brown, 2014, p. 227; Jeronen et. al., 2016, p. 9; Luff, 2018, pp. 452-453). Yet, it is essential that links are made between local and global issues regarding SD (Hofman, 2015, p. 214; Risku-Norja, 2012, p. 13).

4.2.3 Action Competence Approach and Place-Based Education

People are more likely to take action for the environment if they feel that their actions have a meaning and they can make a change (Kollmuss & Agyeman, 2002, pp. 255-256). As Caiman and Lundegård (2013) contend, empowering learners to feel that they are capable of having an impact in a democratic way is paramount in the current global situation (p. 438). Indeed, one of the central aims in ESD is to encourage learners to act for change (Caiman & Lundegård, 2013, p. 438; Hedefalk et. al., 2015, p. 985; UNESCO, 2017, p. 8). Recently, there has been more research on action-oriented learning but it is common to promote action taking and agency by teaching facts (Chawla & Cushing, 2007, p. 437; Hedefalk et. al., 2015, p. 984). However, according to empirical research, these types of normative and fact-based approaches in ESD do not seem to have long-term effects (Hedefalk et. al., 2015, p. 985). On the contrary, Chawla and Cushing's (2007) research on children and young people's environmental programmes reveals that most successful programmes incorporate authentic action and enacting change (p. 441). Practicing participation, decision-making, action-taking and democracy should start already in early childhood education (Chawla & Cushing, 2007, p. 442; Luff, 2018, p. 451).

There are several educational ideals on how to promote learners' agency (Caiman & Lundegård, 2013, p. 437). Examples of these are action competence approach and place-based education. Action competence approach does not refer to a special attainable competence but is a more general educational ideal, which inclines towards the intrinsic views of ESD (Mo-

gensen & Schnack, 2010, pp. 60, 62-63). In this approach, the main goal is to empower learners to be conscious and active change agents (Mogensen & Nielsen, 2011, p. 33; Mogensen & Schnack, 2010, pp. 68-69). The principles of critical pedagogy are employed when root causes of SD-related problems are scrutinised in critical, interdisciplinary and holistic ways (Mogensen & Schnack, 2010, p. 62). Values and ethics are an integral part of action competence approach, and learners are encouraged to develop their moral thinking through engaging in real-world situations (Grice & Franck, 2017, pp. 263-264; Mogensen & Schnack, 2010, p. 62). Respectively, the most important element is intentional and purposive action, which, in the case of formal education, responds to a real problem either in a school or a community level (Katsenou, Flogaitis & Liarakou, 2013, p. 243; Mogensen & Schnack, 2010, p. 61; Villanen, 2014, p. 42; see Dewey, 1957, pp. 60-61).

Real-life connections are a central aspect also in place-based education (Hofman, 2015, p. 218; Villanen, 2014, p. 45). Learning institutions should not be isolated from the other spheres of life but embrace learners' various experiences and collaborate with different stakeholders (Dewey, 1957, pp. 72-73; Katsenou et. al., 2013, p. 244; UNESCO, 2017, pp. 7, 55). Acknowledging the opportunities for formal, informal and non-formal learning that exist when collaborating with communities is essential in ESD (Katsenou et. al., 2013, p. 244; UNESCO, 2017, pp. 7, 55). Out-of-school activities in nature and with the local community, as well as strengthening understanding and interest in the local place, are central components of formal place-based education (Hofman, 2015, p. 218; Villanen, 2014, p. 45). Since public action is more influential than individual action in terms of bringing about change, Chawla & Cushing (2007) emphasise that learners must develop both their individual and collective competencies to be able to contribute on a larger scale (p. 437).

In action-oriented approaches, age-appropriateness is an important factor to consider (Chawla & Cushing, 2007, p. 438). The scale and context of the action need to be accommodated to the age and skills of the participants (ibid.). The problem identification and action should derive from learners' interests because this commits them to the projects and enables them to feel that they can truly have an impact on issues they find important (Chawla & Cushing, 2007, p. 448; Hofman, 2015, p. 218; Katsenou et. al., 2013, p. 254). Nevertheless, it is recommended to start practicing participation skills in everyday life contexts, for example in own classroom, and gradually extend it to the school level, community projects, and larger-scale participation (Chawla & Cushing, 2007, p. 448; Samuelsson, 2011, p. 110).

Furthermore, teachers need to be competent to implement action competence and place-based approaches to ensure that the experiences are educative and empowering (Katsenou et. al., 2013, p. 25; Hofman, 2015, p. 218; Samuelsson, 2011, p. 110). Teachers cannot be dominating in these processes because otherwise learners' participation is not authentic, which may lead to feelings of insecurity and passivity, as noticed in Katsenou's et. al. (2013) participatory action research in a Greek school (p. 254). Children and young people need experiences of being taken seriously and succeeding at least in some of their aspirations, which must be enabled by schools and their stakeholders (Chawla & Cushing, 2007, p. 441; Katsenou et. al., 2013, p. 255). Nevertheless, in action-oriented learning, the action and quality learning should be prioritised over the project outcomes (Hofman, 2015, p. 218). This should be communicated to the learners to show them their participation is valuable (Hofman, 2015, p. 218; Katsenou et. al., 2013, p. 254) "while maintaining a realistic view of the modern world complexity and limitations" (Katsenou et. al., 2013, p. 254).

4.2.4 Transformative Learning

Transformative learning is a constructivist adult learning theory originally developed by Mezirow. Its foundation is the notion that frames of references, in other words "the structures of assumptions through which we understand our experiences", largely influence people's thoughts, attitudes and behaviours (Mezirow, 1997, p. 5). These frames of references develop mainly through socialisation in childhood (Hoggan, 2016, p. 66; Mezirow, 1997, p. 6). Transformative learning occurs when a conflicting issue cannot be interpreted through an existing frame of reference, and critical reflection leads to transforming the fixed thought patterns (Mezirow, 2012, p. 85; Mezirow, 1997, p. 7). This process is not only cognitive but involves also subject's feelings and actions (Mezirow, 1997, p. 5; O'Sullivan, 2012, p. 164). Reviewing 206 articles on transformative learning, Hoggan (2016) proposes extending the original understanding of transformative learning as a perspective transformation to cover "processes that result in significant and irreversible changes in the way a person experiences, conceptualises and interacts with the world" (p. 77).

Deep transformations in attitudes, values and behaviours are needed to impede and adapt to the perils of current the unsustainable state of the world (O'Sullivan, 2012, pp. 165, 176; Sharpe, 2016, p. 218). Transformational learning can facilitate this learning by eliciting transformations in learner's worldview, self, epistemology, ontology, behaviour and capacity

(Hoggan, 2016, p. 78; see O'Sullivan, 2012, pp. 165, 176; Sharpe, 2016, p. 218; Sterling, 2011b, pp. 25-26). The theory shares some characteristics with action competence approach and critical pedagogy (Piasentin & Roberts, 2018, p. 698; Sterling, 2011b, p. 20), and critical reflection is at the heart of transformative learning (Taylor, 2007, p. 174). Piasentin and Roberts (2018) argue that critically reflecting on the value systems that underlie the current socio-environmental problems both on individual and collective levels is the main incentive for transformations towards pro-sustainability (p. 711). However, not any reflection leads to transformative learning but the type of reflection that ought to be fostered is premise reflection (Taylor, 2007, pp. 185-186), which means questioning "the presuppositions underlying our knowledge" (Kreber, 2004, p. 31).

Transformative learning is not an easy process either for the teacher or the learner (Sterling, 2011b, p. 29). In Taylor's (2007) literature review concluding 40 studies, experiential and authentic learning, variety of learning activities, and adequate support are identified as the main ways of fostering transformative learning (p. 182). The teacher must be attentive and sensitive to respond to the learners' experiences during the different phases of transformative learning and to detect their "pedagogical entry points" or "state of readiness" (Sterling, 2011b, p. 27; Taylor, 2007, p. 187). Moreover, some support and instructions on how to translate the new perceptions into action are needed (Taylor, 2007, p. 187). However, transformative learning is essentially a collaborative inquiry, and caring, trusting and warm relationships seem to be major contributors in the process (Ojala, 2017, p. 82; Taylor, 2007, pp. 187-188). Emotions also play a crucial role in transformative learning (Kollmuss & Agyeman, 2002, p. 253; Ojala, 2017, p. 82; Sterling, 2011b, p. 27; Taylor, 2007, pp. 187-188). As frames of references "provide us with a sense of stability, coherence, community and identity", critically reflecting on them can be a painful experience (Mezirow, 2000, p. 18). Nevertheless, there is little research on how to evoke emotions that support transformative learning, especially while engaging in critical deliberation (ibid.). This is a crucial question that concerns ESD in general.

As discussed earlier, it is typical to employ defense mechanisms when confronting something negative, complex or worrisome (Coelho et. al., 2017, p. 133; Kollmuss & Agyeman, 2002, p. 257). As SD is inherently a complex concept which deals with alarming and urgent local and global problems, this challenge must be considered to avoid reinforcing a sense of hopelessness and helplessness (Kollmuss & Agyeman, 2002, p. 255). It is vital to foster hope and posi-

tive visions of future when engaging in critical deliberation and generally in ESD (Brantmeier, 2013, p. 250; Freire, 1996, p. 91; Hicks, 2014, p. 109; Hofman, 2015, p. 218; Ojala, 2017, p. 76; Samuelsson, 2011, p. 112; Villanen, 2014, p. 42). Chawla and Cushing (2007) suggest that collaboration with other people and a sense of collective competency can help to overcome the feelings of hopelessness (p. 446). In Piasentin & Roberts' (2018) study on a university course that addresses SD, positive examples of people who have engaged successfully in issues related to SD as well as addressing practical tools that help to foster SD help students to feel hopeful and motivate them to act (p. 711). These are in conjunction with Ojala's (2017) findings regarding hope and climate change. She argues that "by showing that another way of being is possible, by encouraging trustful relationships and by giving young people the opportunity to concretely work together for change", transformative ESD is possible (p. 82).

4.2.5 Social Learning

Social learning theory, originally developed by Bandura, is a learning theory, which acknowledges that learning always takes places in a social context and emphasises the meaning of learning from others through observing and modelling (Bandura, 1977, pp. 5-6). Sol et. al. (2013) define social learning "as an interactive and dynamic process in a multi-actor setting where knowledge is exchanged and where actors learn by interaction and co-create new knowledge in on-going interaction" (p. 37). New ways of being, thinking and living are urgently needed, and engaging in social learning processes with diverse people can trigger these changes and enable creating new types of solutions for example in local or scientific communities (Barth & Michelsen, 2013, p. 114; Dlouhá et. al., 2013, p. 64; Sol et. al., 2013, p. 35; Wals, 2011, pp. 181-183). Furthermore, social cohesion and feeling of belonging to a community support finding purpose and greater meaning in enacting changes (Wals, 2011, pp. 181-183), which is essential for a large-scale societal commitment to sustainable behaviour. Even though social learning can occur either passively or actively (Glasser, 2007, as cited in Barth and Michelsen, 2013, p. 111), the type of social learning, which centres around finding sustainable solutions, is intentional learning and always has an element of social action (Barth & Michelsen, 2013, p. 111).

Examples of social learning with the aim of advancing sustainable decision-making are science-policy-society engagement and participatory decision-making processes, in which decisions are a result of collaboration and dialogue between scientists, citizens, policy-makers and

other stakeholders, such as private sector, NGOs and indigenous groups (Didham, Ofei-Manu & Nagareo, 2017, pp. 832-833; Sol et. al., 2013, p. 35; see Miller, 2013, pp. 287-288; Wittmayer & Schäpke, 2014, pp. 485, 489). In addition to being beneficial in terms of finding just and creative solutions by bringing multiple actors together, social learning processes facilitate developing individual and collective competencies, which support furthering SD also in other occasions (Barth et. al., 2017, p. 813).

Universities and scientists can facilitate social learning processes and advance SD also on a practical level (Dlouhá et. al., 2013, p. 65; Miller, 2013, pp. 287-288; Wittmayer & Schäpke, 2014, pp. 485, 489). However, Wals (2011) argues that it is important that social learning experiences are organised in collaboration with the educational field (p. 184). Yet, social learning does not need to occur in formal education (ibid.) or to be a teaching activity (Barth & Michelsen, 2013, p. 112). Instead, Barth and Michelsen (2013) argue that educational science should contribute to social learning primarily through creating informal social learning environments (p. 112).

Building on five empirical case studies about ESD in community settings in Asia, Didham et. al. (2017) propose that the process of social learning involves the following stages: "reflective observation; vision forming; pragmatic testing; planning actions; implementation; and monitoring and evaluation" (p. 844). Similar to transformative learning, the process of social learning challenges both the facilitator and the participants as they need to be competent to "trigger and support a learning process powerful enough to realise transitions that require a change of values, corporate culture, lifestyle, and, ultimately, a whole system redesign" (Wals, 2011, p. 184). Diversity and pluralism of participants' knowledge, values and opinions are essential for finding new ways of approaching complex issues instead of settling to business as usual solutions (Barth & Michelsen, 2013, p. 111; Læssøe, 2010, p. 54; Wals, 2011, p. 184). However, too high level of dissonance without social belonging or cohesion may also hinder learning, thus the facilitator needs to be sensitive to the participants' comfort zones (Wals, 2011, p. 184). As discussed in regard to critical pedagogy, authentic dialogue is an important means for learning and engaging with pluralist of views and it requires a respectful, trustful and caring environment (Freire, 1996, pp. 88-89). This also applies to social learning, in which "empathy or a willingness to open up to and sympathise with 'otherness' and/or the other" are central aspects (Wals, 2011, pp. 182-183).

In Sol's et. al. (2013) framework of the dynamics of social learning (*Figure 7)*, the learning process demands mutual trust, commitment of all parties and shared reframing, which occur iteratively over a period of time (p. 41). The framework is based on a case study conducted in the Netherlands, in which multi-actor collaboration was chosen as an approach to address tensions in land use sector (Sol et. al., 2013, p. 38). Even though the framework is preliminary and needs to be further tested in empirical research, it supports the notion that social dynamics play an important role in social learning, and regardless of participants' diverse opinions and values, mutual trust and respect must be present in the process (Sol et. al., 2013, p. 41).

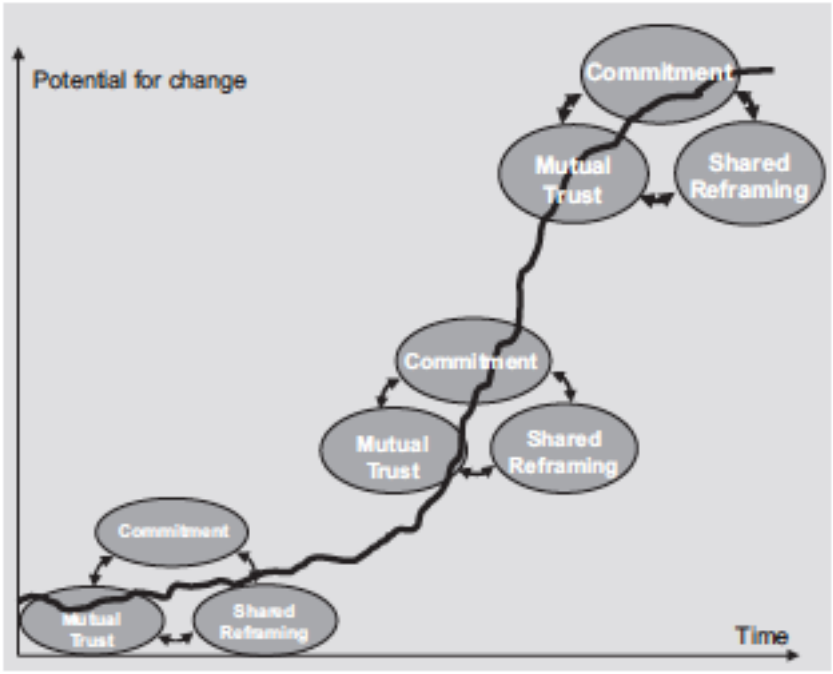

Figure 7. Social learning as the dynamic interplay of shared reframing, mutual trust and commitment (Sol et. al., 2013, p. 41).

5 ESD in Formal, Non-Formal and Informal Contexts

Barth and Michelsen (2013) state that ”as a unique educational concept, ESD is an area of educational practice that both makes a significant contribution at all of the different levels of formal education and also acknowledges the relevance of non-formal as well as informal education” (p. 106). The following sub-chapters focus on how ESD can be organised in formal, non-formal and informal learning settings. Furthermore, some relevant features and concerns in regard to ESD in these different forms of learning are discussed. Distinguishing between the three forms of learning is not straightforward. Therefore, the way these sub-chapters are constructed is only referential and the contents in one may apply also to other forms of learning. In the context of ESD, it seems that learning activities are often a combination of formal, non-formal and informal learning, which is an asset as it enables holistic learning that crosses traditional boundaries (UNESCO, 2012, p. 58; Wals et. al., p. 785).

Even though the arguments in the following sub-chapters are general, it is important to acknowledge that different countries and regions have vastly differing starting points and resources for implementing ESD in formal, non-formal and informal education. For example, Ongevalle, Petegam, Deprez and Chimbodza’s (2011) case study from Zimbabwe describes how incorporating EE in teacher education “in a context of deep crisis” (p. 434) caused by socio-economic problems and environmental vulnerability is problematic in terms of project sustainability and funding. Yet, the studied project has been successful by providing a learning opportunity for all the participants due to critical self-reflection (Ongevalle et. al., 2011, p. 447). However, a critical remark is made here that even though ESD is crucial everywhere, the contextual factors greatly influence how it can be organised in formal, non-formal and informal contexts in different parts of the world and what kinds of challenges emerge. Moreover, the learning needs in different regions vary vastly, thus local actors make a significant contribution to adjusting ESD to the local needs.

5.1 Implementing ESD in Formal Education

Formal education is the most scalable type of education as it reaches essentially all children and young people in high-income countries and an increasing number of children and young people in lower income countries (UNESCO, 2019, pp. 122-124). Thus, fostering sustainability in mainstream education can crucially contribute to a more sustainable world (e.g. Salor-

anta, 2017, p. 223). As discussed earlier, ESD from early childhood on can support learning the skills needed in today's rapidly changing world, promote nature connectedness and sustainable behaviour as well as empower learners to act for change (Bangay, 2016, p. 5; Laurie, Nonoyama-Tarumi, McKeown & Hopkins, 2016, p. 236, Otto & Pensini, 2017, p. 93; Uitto, 2012, p. p. 177). Furthermore, higher education is an important platform for learning about, creating, and sharing sustainable solutions (Bangay, 2016, p. 5; Karatzoglou, 2013, p. 44). Synthesising research from 18 countries, Laurie et. al. (2016) argue that ESD can improve the overall quality of education in terms of enriched curricula, connecting schools with their local communities, innovative teaching and learning methods, supporting students to be more prepared for an uncertain future, and possibly by resulting in increased academic performance. Nevertheless, more robust empirical evidence is needed to confirm these research results (Laurie et. al., 2018, p. 240).

In formal education, a formal curriculum and syllabus are implemented (Tudor, 2013, p. 822). As mentioned earlier, there is no universally established curriculum for ESD but instead, the learning contents are proposed to be contextual and reflect local issues, which are then linked to global sustainability (Hofman, 2015, p. 224; Risku-Norja, 2012, p. 13; Wals, 2010, p. 144). Some guidelines for implementing ESD are presented in UNESCO's (e.g. 2014c & 2017) documents, yet national and local actors decide how, if at all, these are taken into consideration in educational policies and curricula (Bourn et. al., 2017, p. 5). Moreover, there are several perceptions about how, in practice, ESD should be embedded in formal education. For example, whether it should be a discipline on its own, a cross-curricular theme, or the basis for all education has been debated (e.g. Orr, 2004; Sterling, 2011a).

UN Decade of Education for Sustainable Development (DESD, 2005-2014) "aimed at integrating the principles and practices of sustainable development into all aspects of education and learning, to encourage changes in knowledge, values and attitudes with the vision of enabling a more sustainable and just society for all" (UNESCO, 2014b, p. 5). The decade succeeded in raising global awareness about the need to incorporate ESD into educational policies and curricula (Pigozzi, 2010, p. 262; UNESCO, 2014b, p. 6), which can be also noted in an increase of ESD policy research after the launch of the decade (Aikens et. al., 2016, p. 337). Furthermore, drawing on Karatzoglou's (2013) synthesis of 123 academic publications on ESD in higher education, it seems that universities are increasingly interested in integrating SD into their policies, curricula and practices. However, reviewing 215 research articles

on ESD policy research, Aikens et. al. (2016) reveal that incorporating ESD as a cross-cutting theme into national K-12 curricula has not so far been very successful in immersing sustainability (p. 345).

Furthermore, even if national curricula enabled embedding ESD in formal education, its implementation is often determined by teachers' personal interest in the topic, and promoting a sustainable school culture is often overly dependent on individual teachers' attempts (Bourn et. al., 2017, p. 8; Jóhannesson, Norðdahl, Óskarsdóttir, Pálsdóttir and Pétursdóttir, 2011, p. 383; Saloranta, 2017, p. 158). Yet, the whole institute approach is essential for truly embedding sustainability in formal education, which means that while deliberatively implementing ESD, the whole institute, including its physical premises, and all stakeholders embrace sustainability in any actions taken (e.g. Goldman, Ayalon, Baum & Weiss, 2018, p. 1301; Saloranta, 2017, p. 215; UNESCO, 2017, p. 19; UNESCO, 2014b, p. 7).

Thus, it is crucial that, first, teachers have a holistic understanding of SD, second, they are competent to implement ESD in a pedagogically sound manner, and third, they have the resources and time needed for ESD because formal education has a myriad of competing learning objectives (Aikens et. al., 2016, p. 348; Bertschy, Künzli & Lehmann, 2013, p. 5068; Bourn et. al., 2017, p. 9; Gustafsson, Engström & Svenson, 2015, p. 7; Saloranta, 2017, p. 224). Furthermore, school principals have a significant impact on creating a sustainable school culture, hence their contribution is also essential (Saloranta, 2017, p. 216).

Some empirical studies from Nordic countries reveal that teachers' personal and/or subject background has a significant impact on from which angle they approach SD, what they consider as their strengths and weaknesses in implementing SD, and what kinds of pedagogical strategies they choose to use in ESD (Borg, Gericke, Höglund & Bergman, 2012, p. 185; Saloranta, 2017, p. 225; Uitto & Saloranta, 2017, pp. 1, 16). To ensure that all teachers, despite their background, are competent to implement ESD in a holistic and interdisciplinary way, a sufficient response from initial and in-service teacher training institutions is needed (Bourn et. al., 2017, p. 5; Mulá et. al., 2018, p. 798). Therefore, teacher educators are in a critical role for ensuring that curricula and teaching methods prepare teachers to address complex sustainability phenomena in schools (Bourn et. al., 2017, p. 5; Mulá et. al., 2018, p. 798). This, of course, applies to any university staff who train future professionals (Mulá et. al., 2018, p. 815). According to a UNESCO commissioned review about ESD and global citizenship edu-

cation in teacher education, SD has globally become a more acknowledged concept in teacher education (Bourn et. al., 2017, p. 7). However, ESD is not embedded in teacher training courses in a systematic way (Bourn et. al., 2017, p. 12). Furthermore, a survey study conducted by Sinakou, Boeve-de Pauw, Goossens and Van Petegem (2018) reveals that teacher educators from several continents do not have a holistic understanding of SD (p. 330).

Despite an increased awareness of the importance of incorporating ESD into formal education, a lot remains to be done to mainstream ESD and to ensure that education systems foster SD rather than contribute to transmitting unsustainable values and practices (Bertschy et. al., 2013, p. 5077; Brissett & Mitter, 2017, p. 201; Huckle & Wals, 2015, p. 491; Mulá et. al., 2018, p. 798). Huckle and Wals (2015) argue that DESD "failed to acknowledge or challenge neoliberalism as a hegemonic force blocking transitions towards genuine sustainability" (p. 491). Furthermore, an example from Japan illustrates that even though ESD has been endorsed in Japanese policies since 2006, this has not resulted in the desired changes "deep enough to affect a values system" (Nagata, 2017, p. 30). Nagata (2017) argues that this is due to a traditional and results-oriented education system, which cannot effectively and dynamically promote ESD (pp. 38-39).

In fact, many experienced environmental and sustainability educators and authors such as Hicks (2014), Huckle and Wals (2015), Orr (2004) and Sterling (2011a) advocate a new type of an educational paradigm and changing the currently prevalent neoliberalist education model radically. Shallow interpretations of ESD are not sufficient but education systems should consider fostering sustainability as an inherent basis for any education (Hicks, 2014; Orr, 2004; Sterling, 2011a). Reforming education systems is a slow process, yet there is a limited time for doing it due to the current, risky development trends (Sterling, 2011a, p. 77). Moreover, there are several competing and sometimes contrasting interests in regard to formal education, which often lead to giving less priority to ESD both in primary, secondary and tertiary levels of education and in teacher training (Aikens et. al., 2016, p. 348; Bourn et. al., 2017, p. 9). It is crucial that decision-makers are involved in and committed to organising formal education in a way that embraces sustainability (Sterling, 2011a, p. 79; UNESCO, 2014b, p. 17). Having a clear vision of the purpose of education and clarifying the core values that underlay it are important aspects in this process (Sterling, 2011a, p. 77). Moreover, facilitating teachers, teacher educators, and decision-makers' learning about SD and ESD is critical for ensuring that they have a holistic understanding of these topics and they are able to foster learning

for sustainability (Dyment et. al., 2014, p. 660; Laurie et. al., 2018, pp. 239-240; Mulá et. al., 2018, p. 815; Sinakou et. al., 2018, p. 330; UNESCO, 2014b, p. 17).

5.2 ESD in Non-Formal Learning Contexts

Defining non-formal ESD univocally is difficult, however, it can for example refer to activities, which connect learning institutions with local communities, participatory decision-making processes (see 4.5. Social Learning), and learning activities facilitated by community organisations or learning centres (e.g. Barth et. al., 2017, p. 814; Didham et. al., 2017; Sol et. al., 2013; Zachariou & Symeou, 2008; UNESCO, 2014b, pp. 14, 17). Also, technology provides new means for building non-formal learning communities that engage in issues related to SD (Aguayo & Eames, 2017, pp. 890-892). According to UN DESD Final Report, non-formal ESD activities have become more common during DESD (UNESCO, 2014b, p. 17), and in several countries, NGOs play a crucial role in promoting ESD in teacher training (Bourn et. al., 2017, p. 5).

Being more flexible than formal education, non-formal education allows implementing ESD in a more holistic and interdisciplinary way and enables introducing creative teaching and learning methods and projects that are more difficult to implement in formal education (Tolppanen, Vartiainen, Ikävalko & Aksela, 2015, p. 336, see Shohel & Howes, 2011, p. 134). This is especially crucial in contexts in which the formal curriculum does not support ESD or formal education is not accessible to learners at all (Shohel & Howes., 2011, p. 134; Wals et. al., 2017, p. 789). Furthermore, placing local community at the heart of ESD allows connecting several stakeholders and areas of expertise to jointly generate sustainability transformations, and accordingly enables implementing ESD based on the pedagogical principles, which are currently considered the most beneficial in academic literature (e.g. Zachariou & Symeou 2008, pp. 138-140).

However, non-formal ESD programmes are often encumbered by unsteady funding (Akar, 2016, p. 31; Wals et. al., 2017, p. 789). Moreover, the lack of evaluation methods for assessing the impact of ESD programmes, especially in terms of empowerment to take action for change, is a challenge for both research and practice also in non-formal ESD and impedes identifying and isolating factors that make the learning experiences impactful (O'Flaherty & Liddy 2018, pp. 13-14). Yet, some studies of non-formal ESD activities and their outcomes

are introduced next elaborating on the aspects that the authors consider as important for the programmes' success.

Aguilar (2018) reviews 73 articles of community-based ESD programmes and concludes that connecting learning with the local context and culture and addressing issues relevant in the specific community are beneficial especially for learning about social and cultural aspects of sustainability. Also, partnerships, communication and dialogue are regarded as valuable components in community-based ESD (ibid.). Wynveen's (2017) formative research with four organisational groups in a study community in Texas focuses on non-environmentally motivated individuals. The results suggest that emphasising all areas of sustainability and their interconnectedness, demonstrating how a sustainable lifestyle may be advantageous in the participant's individual situation, illustrating a sustainable lifestyle in a clear and easily adoptable way, and open dialogue are essential when endeavoring to initiate sustainable behavior (ibid.). Akar (2016) reviews 46 studies from all around the world, which examine extracurricular and non-formal learning activities with a focus on ESD or global citizenship education. In addition to the already mentioned factors, Akar (2016) concludes that including learners in the planning, implementation and monitoring of the learning activities is an important aspect in non-formal ESD (p. 31). Also, activities that engage the participants in artistic expression seem to be fruitful for learning for sustainability (ibid.).

Ofei-Manu and Didham (2018) have developed a 'Sustainability Learning Performance Framework' (SLPF, *Figure 8*), which builds on an extensive literature review and three case studies of community-based ESD programmes in Asia. Figure 8 provides an overview of the SLPF tool and its elements, which are 1) learning process, including progressive pedagogies and cooperative learning relationships, and 2) educational contents, referring to sustainability competencies and a framework of understanding and world-view (Ofei-Manu & Didham, 2018, p. 1181). A more detailed list of the factors that are evaluated in regard to the different elements can be found in Ofei-Manu and Didham's (2018) article (p. 1182). The SLPF needs to be further tested and developed to ensure its accuracy and suitability to different contexts (Ofei-Manu & Didham, 2018, p. 1183). However, it is a promising tool for evaluating and scaling up non-formal ESD programmes. It can also be utilised in the context of formal education, for example in curriculum development, teacher training, and in developing a sustainable school culture and ESD learning activities (Ofei-Manu & Didham, 2018, p. 1182-1183).

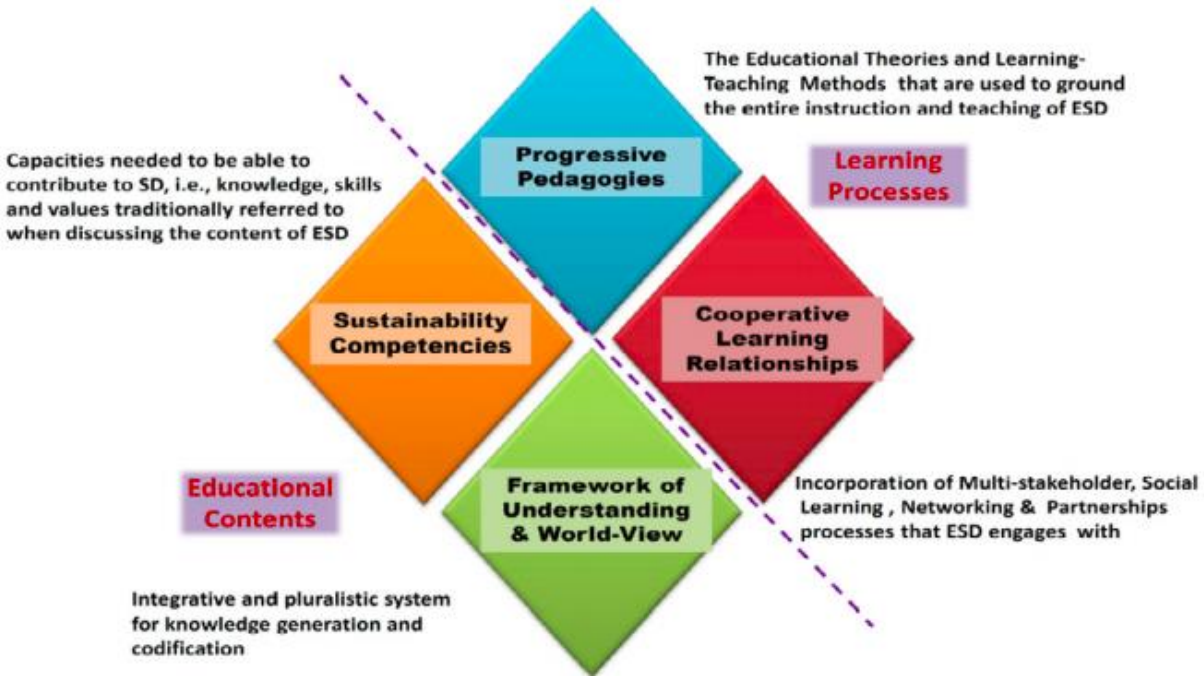

Figure 8. The four elements of Sustainability Learning Performance (Ofei-Manu & Didham, 2018, p. 1181).

5.3 Informal Learning for Sustainability

As discussed in regard to sustainable behaviour (chapter 3), several factors outside formal education influence human behaviour. For example, families, peers, media, and social and cultural norms are all prominent in the socialisation process (Leidy & Parke, 2015, p. 866; Nussbaum, 2010, pp. 38-39, 44-45; Schunk, 2012, p. 258). When learning occurs unintentionally in everyday contexts, it is called informal learning (Barth et. al., 2017, p. 814; Tudor, 2013, p. 822). According to UNESCO (2014a), ”informal education results from daily life activities related to work, family or leisure, and is provided within families, religious organizations, community groups and traditional culture, as well as by news organizations, social media and various forms of entertainment” (p. 20). Tudor (2013) speculates that informal learning is very influential and most adult learning occurs informally (p. 822; see Barth et. al., 2017, p. 814). Therefore, the importance of informal ESD is emphasised by UNESCO and several authors (e.g. Barth et. al., 2017, p. 814; Barth & Michelsen, 2013, p. 112; Gokool-Ramdoo & Rumjaun, 2017, p. 80; UNESCO, 2017, p. 7; UNESCO, 2014b, p. 17; Wals et. al., 2017, p. 784).

However, as informal learning may occur anywhere, it is difficult to define when, where and how informal learning for sustainability takes place and how it can be facilitated. Furthermore, informal learning is not always distinguished from non-formal learning (Barth et. al., 2017, p. 814). Indeed, some of the aspects discussed in the previous sub-chapter may also apply to informal learning. For example, a social learning process, which brings multiple actors together over an issue can be considered either as informal or non-formal learning depending on its focus (see Barth et. al., 2017, p. 814; Herron & Mendiwelso-Bendek, 2018, p. 825). Moreover, if engaging in this type of collaboration is part of formal education, the learning experience blends all the three forms (see Wals et. al., 2017, p. 790). On the other hand, informal learning may also occur in formal settings. For example, Barth, Godemann, Rieckmann and Stoltenberg (2007) call for creating space for informal ESD in universities through enabling activities such as peer discussions and voluntary work (pp. 420; 427). Informal learning can also drive organisational changes towards sustainability (Barth & Michelsen, 2013, p. 110). In fact, according to the UN DESD Final Report, there has been promising development in the private sector concerning companies' sustainability performance over the DESD partly due to informal, non-formal and, in some cases, formal learning (UNESCO, 2014a, p. 31).

A study from Varela-Candamio et. al. (2018) suggests that informal environmental education in the form of public campaigns positively influences pro-environmental behaviour (p. 1573). Media and ICT provide plenty of informal learning opportunities, which may influence people's knowledge, attitudes or behaviour concerning sustainability (UNESCO, 2014a, p. 65). However, it is important to note that the connection between environmental awareness or attitudes and sustainable behaviour is ambiguous (Gifford & Nilsson, 2014, p. 142; Kollmuss & Agyeman, 2002, p. 250; Varela-Candamio et. al., 2018, p. 1573; Wals, 2011, p. 179). Generally, cultural norms and what is considered as socially acceptable can shape people's behaviours either to a more sustainable or unsustainable direction (Gadenne et. al., 2011, p. 7684; Gifford & Nilsson, 2014, p. 141; Kollmuss & Agyeman, 2002, p. 239; Varela-Candamio et. al., 2018, p. 1573). For example, Babutsidze and Chai's (2018) study with more than 3,000 Australian participants reveals that people tend to perform a similar amount of green-house gas mitigation measures as their neighbours, which suggests that regional social norms influence sustainable behaviour (p. 299). Also, learning from role models and peers is conducive to responsible environmental behaviour (Chawla & Cushing, 2007, p. 445). These studies reveal that social and cultural environments, which encourage sustainable lifestyles, are cru-

cial platforms for informal ESD. However, the question of how to ensure that they foster sustainability by breaking the "vicious cycle, where formal institutions and existing consumption habits reinforce disincentives for citizens to actively pursue sustainability" remains (Fischer et. al., 2012, p. 159).

6 Conclusions and Discussion

In this final chapter, the main findings of this thesis are summarised. As the research questions are broad and there is a vast amount of research relevant to both of the questions, this study answers them on the basis of the selected materials. In the second sub-chapter, a model 'Individuals, Communities and Societies Learning to Enable Sustainability Transformations', is introduced suggesting one approach to perceiving how pathways towards sustainability can be facilitated through learning and involvement of all societal actors.

6.1 Summary of the Main Findings

Pro-environmental and sustainable behaviours are complex phenomena, which have been studied from multiple perspectives during the past decades (e.g. Gifford & Nilsson, 2014; Kollmuss & Agyeman, 2002; Tapia-Fonnlem et. al., 2013; Varela-Candamio et. al., 2018). Nevertheless, in the light of current scientific understanding, commitment to sustainable behaviour and its determinants cannot fully be explained (Gifford & Nilsson, 2014, p. 141; Kollmuss & Agyeman, 2002, p. 239). Research reveals that demographic, internal and external factors all have an impact on pro-environmental behaviour (Gifford & Nilsson, 2014, p. 141; Kollmuss & Agyeman, 2002, p. 239). Socialisation processes through which people learn the values and norms of their social and cultural environments (such as families, peer groups, communities or societies) have a significant impact on sustainable behaviour and taking action for sustainability (e.g. Chawla, 1998, p. 21; Chawla, 1990; Collado et. al., 2017, p. 34; Evans et. al., 2018, p. 684; Over, 2018, p. 18). Moreover, there seems to be a link between nature connectedness and sustainable behaviour (Kollmuss & Agyeman, 2002, p. 254; Martin & Czellar, 2017, p. 65, Restall & Conrad, 2015, p. 273; Otto & Pensini, 2017, p. 93; Roczen et. al., 2014, p. 986).

Even though the connection between education, especially in terms of raising awareness, and sustainable behaviour is ambiguous (Kollmuss & Agyeman, 2002, pp. 253-254; Wals, 2011, p. 179), education is crucial for achieving the SDGs and can support building competencies, which are necessary for a sustainable future (Bengtsson et. al., 2018, p. 161; Sterling, 2010, p. 522; Wals, 2011, pp. 179-180). Thus, it is critical to ensure that education is accessible for everyone and improve its overall quality worldwide (see UNESCO Institute for Statistics, 2017). This evidently requires investments and resources. Yet, education should not be per-

ceived as an instrument for behaviour change but quality education should be valued intrinsically (Bengtsson et. al., 2018, pp. 19, 162). Nevertheless, education can also support transmitting unsustainable values and lifestyles, a criticism that in particular seems to apply to neoliberal education (Hofman, 2015, p. 223; O'Brien & Howard, 2016; Sterling, 1996, p. 18; UNESCO, 2016, pp. 11, 162; Villanen, 2014, p. 19). Therefore, ensuring that education fosters sustainability is critical.

Sustainability science has led to the emergence of a new educational field, ESD (Barth & Michelsen, 2013, p. 105). ESD is an educational concept, which has initially been promoted by the UN and UNESCO but which has become a fairly established field of research and practice during the past decades. There is debate concerning the nature of ESD whether it being more instrumental or intrinsic, however, some scholars suggest that integrating these both approaches is essential (Sterling, 2010, p. 525; Vare & Scott, 2007, p. 191). Even though ESD can be implemented for example as courses or community-based programmes, it is not considered to be a separate learning intervention. On the contrary, ESD is suggested to be a foundation for any education (Gokool-Ramdoo & Rumjaun, 2017, p. 79; Hicks, 2014; MacDonald, 2015; Orr, 2004; Sterling, 2011a; UNESCO, 2017). Yet, as there are countless interests concerning education, many of them being contradictory, ensuring that education contributes to a more sustainable world on a broad enough scale is difficult and requires a system-wide response from educational institutions, organisations, teachers, principals, administrators, learners, and decision-makers.

Some useful pedagogies that are often discussed in ESD literature include critical pedagogy, experiential and outdoor learning, action competence approach and place-based education, transformative learning, and social learning. They can be applied in ESD taking into account the learning goals and the age and needs of the participants. Furthermore, commitment of the whole institute or school community is of great importance for delivering quality ESD and for showing an example of sustainable living for the learners (Goldman et. al., 2018, p. 1301; Saloranta, 2017, p. 215). However, even though there is more and more research on ESD pedagogies and practices, it is difficult to examine what factors determine the success of ESD programmes and how ESD can empower learners to take action for change (O'Flaherty & Liddy, 2018, pp. 13-14; see Stern et. al., 2014, p. 603). Thus, many of the conclusions about purposeful pedagogical methods are based on philosophical and theoretical literature. More research that focuses on the behavioural and long-term outcomes of ESD and utilises innova-

tive research methods is needed to confirm what kinds of pedagogical methods are most suitable for transformative ESD.

As learning is not restricted to formal education, ESD concerns both formal, non-formal and informal educational contexts (Barth et. al., 2017, p. 814; UNESCO, 2017, p. 7). It is becoming more common to blend these forms of learning through for example community-based learning experiences that include participants from schools, organisations, business world, and/or public authorities (UNESCO, 2012, p. 58; Wals et. al., 2017, pp. 785, 790). People at all ages need to learn, on the one hand, to ensure large and fast enough sustainability transformations on individual and collective levels and both in public and private sectors, and, on the other hand, to support people and societies' resilience and capacity to adjust to a world that is inevitably changing. Thus, life-long learning is pivotal (Arbuthnott 2009, p. 162; Didham et. al., 2017, pp. 830-831; Wals, 2011, p. 180).

ESD alone has limited potential to drive sustainability transformations if the society and its norms, structures and institutions do not immerse sustainability (Arbuthnott, 2009, p. 156; Sterling, 2011a, p. 32; see Gadenne et. al., 2011, p. 7684; Gifford & Nilsson, 2014, p. 141; Kollmuss & Agyeman, 2002, p. 239; Varela-Candamio et. al., 2018, p. 1573). In Velasco and Harder's (2014) exploratory study with data from several continents, the findings suggest that even a pedagogically successful course on sustainable development may not create transferable learning outcomes if the institutional context does not support or enable sustainable behaviour. In this kind of a scenario, it is typical that a gap between individual's values and actions remains (ibid.). Moreover, even though individuals' choices matter, without commitment from masses, these behaviours have usually a small impact on sustainability on a global scale (Saloranta, 2017, p. 85).

Therefore, ESD implemented only within schools and targeted at individuals and their private behaviours cannot initiate large-scale transformations. On the contrary, the magnitude and urgency of the current local and global problems require a joint and continuous learning process, which involves all societal actors to collaboratively seek for more sustainable alternatives and new ways of ensuring social wellbeing within planetary boundaries (Didham et. al., 2017, pp. 830-831; Wals, 2011, p. 181). Building on the main findings of this thesis, a model of how learning on all levels of society is needed for sustainability transformations is introduced next.

6.2 Individuals, Communities and Societies Driving Sustainability Transformations

The following model 'Individuals, Communities and Societies Learning to Enable Sustainability Transformations' (*Figure 9*) illustrates how individuals, communities, and all different societal actors need to engage in life-long learning processes to enable transformations towards a more sustainable world. The model also proposes what kinds of roles and responsibilities individuals, communities and societal actors can have in the joint process of furthering sustainability transformations. There is constant interaction between the three levels and they cannot be univocally distinguished from each other, therefore they are presented inside the same oval. The introduced model is overly simplified and does not for example explicitly include the crucial level of global collaboration. In this interconnected and globalised world, all societal actors introduced in the model work globally or are at least very much influenced by global circumstances and events. This applies also to individuals and communities. Moreover, global agreements and benchmarks are crucial for ensuring fair and just development. However, this model's societal level does not refer only to countries or national solutions but it can also imply larger entities, such as the European Union or the UN.

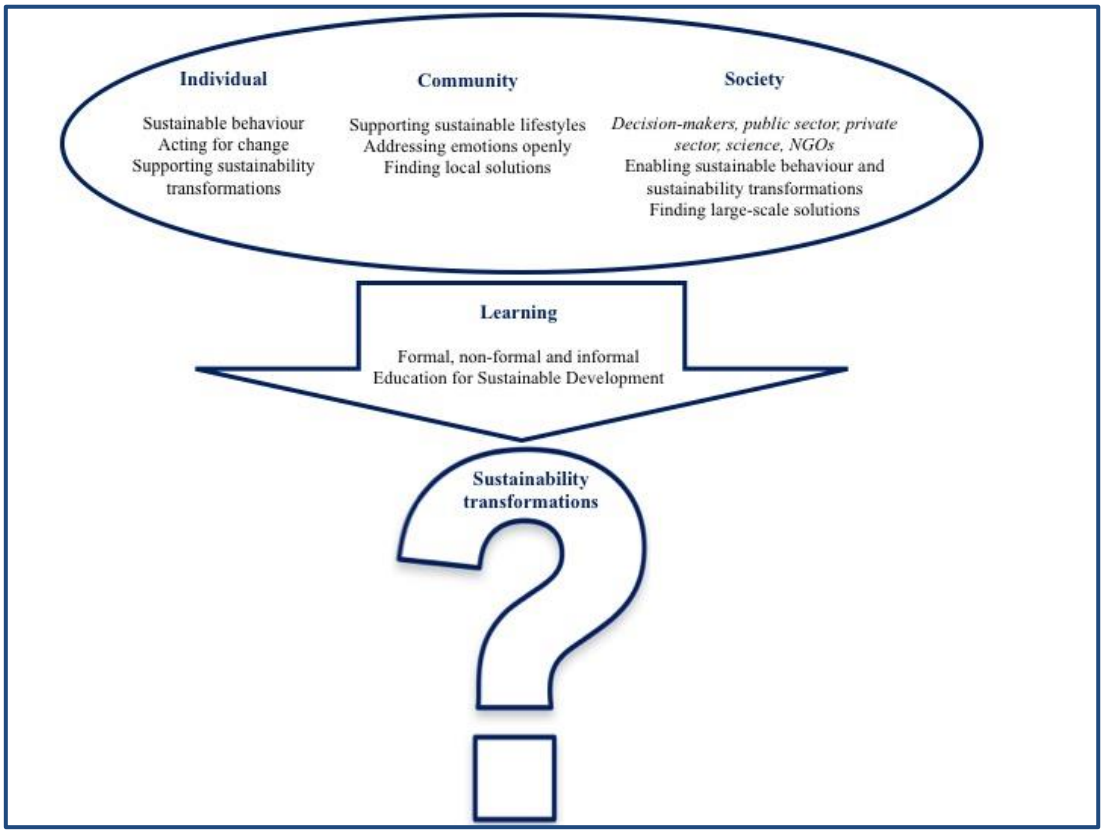

Figure 9. Individuals, Communities and Societies Learning to Enable Sustainability Transformations

Terminology of sustainability transformations is used in the model to emphasise that there is no static state of SD. On the contrary, SD and pathways towards it are highly contextual, and what ultimately is sustainable remains unknown despite all the efforts and research done during the last decades (Miller, 2013, p. 288; Wals, 2011, p. 183; Wals, 2010, p. 144; Welpi et. al., 2003, pp. 23-24). Thus, sustainability transformations are symbolised with a question mark. However, what is certainly known is that major transformations must occur globally to ensure that the global community can function peacefully and justly while facing some major challenges, such as exponential population growth, diminishing natural resources, rapidly changing lifestyles, biodiversity loss, and climate change (e.g. Hofman, 2015, p. 217; IPCC, 2018, p. 17; Tang, 2017, p. 1; Wals et. al., 2017, p. 783; WWF, 2018, p. 8). Individual, communal and societal levels all need to participate in furthering these transformations, and, as underlined in this thesis, learning is central for finding more sustainable alternatives to the current, inherently unsustainable paradigms (e.g. Bangay, 2016, p. 5; Barth & Michelsen, 2013, p. 110; Didham et. al., 2017, pp. 830-831; Salonen & Åhlberg, 2012, pp. 21-22).

ESD implemented in a pedagogically sensible manner in formal, non-formal and informal contexts can encourage sustainable behaviour, bolster learners' competencies, and empower taking action for change (Barth & Michelsen, 2013, p. 110; Mogensen & Schnack, 2010; Ofei-Manu & Didham, 2018, p. 1179; Sterling, 2010, p. 522). Barth and Michelsen (2013) note that ESD often focuses on individuals and their personal growth into responsible human beings who can and want to promote sustainability (p. 107). Individual behaviours and attempts to bring about change are positively essential for SD (Chawla & Cushing, 2007, p. 438). A recent example of how an individual can take action for change and generate an international movement is embodied in Greta Thunberg, a 16-year-old Swede, whose school strike has gained lots of attention worldwide and encouraged young people globally to demand greater efforts for climate change mitigation (CNN, 2019). However, to ensure large-scale sustainability transformations, it is necessary that ESD also focuses on communities and societies, hence ensuring life-long learning opportunities for everyone, including decision-makers, is crucial (Arbuthnott 2009, p. 162; Didham et. al., 2017, pp. 830-831; Wals, 2011, p. 180; see Chawla and Cushing, 2007).

As discussed in the previous chapters, ESD pedagogies emphasise the meaning of community, collaboration and social learning. Building a learning community, which allows individuals to critically contemplate the underlying roots of unsustainability, cultural norms and val-

ues, as well as their own actions is paramount for sustainability transformations (e.g. Barth & Michelsen, 2013, p. 114; Dlouhá et. al., 2013, p. 64; Piasentin & Roberts, 2018, p. 711; Sol et. al., 2013, p. 35; Wals, 2011, pp. 181-183). Furthermore, social norms are an important factor to consider in relation to SD, and individuals' sustainable behaviour can be encouraged through social approval by groups and communities (Arbuthnott, 2009, p. 162; see Babutsidze & Chai, 2018). Also, as discussed earlier, social cohesion and feeling of belonging to a community supports finding purpose and greater meaning in enacting changes (Wals, 2011, pp. 181-183). In his book about eco-anxiety, Pihkala (2017) stresses that for maintaining wellbeing, it is crucial to collectively share emotions that the current state of the world evokes (pp. 16, 220-223). This is essential also in terms of hindering coping mechanisms such as denial, apathy or passivity caused by the enormity of wicked problems (Pihkala, 2017, p. 94). Openly sharing emotions with other people and accepting the distress that exists due to environmental, social and economic crises are important steps towards empowerment to take action (Pihkala, 2017, pp. 16-17). Pihkala's (2017) arguments are consistent with Chawla and Cushing's (2007) and Ojala's (2017) findings about the meaning of collaboratively working together with others to avoid a sense of hopelessness.

Local and community-based endeavours are central for furthering SD, and many decisions concerning sustainability management are done on a regional level (Mebratu, 1998, p. 494; Sol et. al., 2013, p. 35). However, Mebratu (1998) argues that "their impact in shaping 'our common future' on a more sustainable basis seems to be minimal when measured against the enormity of the global environmental challenges" (p. 494). Thus, in addition to local action, larger-scale solutions to SD must be seeked for and endorsed on a societal or international level. If societies and their policies do not support SD, individual and communal level attempts to foster it cannot reach their fullest potential either (Sterling, 2011a, p. 32; Velasco & Harder 2014, pp. 6570-6571). However, policies and their success are largely dependent on the acceptance from publics, thus public support for policies that aim to further sustainability is pivotal (Welpi et. al., 2003, pp. 23-24). This illustrates how learning processes and transformations need to occur simultaneously on all levels of societies.

Different policy tools that can be used in driving sustainability transformations include for example legislation, taxation, regulations and financial benefits, which, in addition to public sector and citizens, concern the private sector (Arbuthnott, 2009, pp. 157, 162; Lehner, Mont & Heiskanen, 2016, p. 168). Societies and institutions can also employ some behaviour

change strategies to facilitate making sustainable choices (Arbuthnott, 2009, p. 159; Lehner, Mont & Heiskanen, 2016, p. 166). As touched upon earlier, behaviour change is a complex process and people do not always act according to available knowledge or their own values, thus it is important that sustainable behaviour is convenient and advantageous (Arbuthnott, 2009, p. 162; Kollmuss & Agyeman, 2002, pp. 241, 252; Vicente-Molina et. al., 2013, pp. 135-136). There are some strategies that aim to engender desired behaviours utilising people's cognitive biases, such as nudging and boosting (Schubert, 2017 p. 330). These types of behaviour change strategies that target a specific behaviour may be useful in some cases, for example when aiming to reduce the use of cars by influencing the availability and cost of parking spaces (Arbuthnott, 2009, p. 156). Nevertheless, caution is needed when utilising them because they can be perceived to violate personal autonomy and pose a risk to democracy (Lehner, Mont & Heiskanen, 2016, p. 175).

Democracy is often considered as an inherent part of SD, and decision-making processes that support equity, participation and multi-stakeholder involvement are crucial for finding just and sustainable solutions (Mielke, Vermaßen, Ellenbeck, Milan & Jaeger, 2016, p. 75; Miller, 2013, p. 288; Wals, 2010, p. 147; Welpi et. al., 2003, pp. 23-24). There are no absolute truths or a flawless plan to respond to the problems of unsustainability, thus decision-making, even if applying scientific knowledge, is based on uncertainties (Miller, 2013, p. 288; Wals, 2011, p. 183; Welpi et. al., 2003, pp. 23-24). A large-scale science-policy-society engagement is needed to ensure that complex phenomena are approached with best available, just and creative solutions (Barth & Michelsen, 2013, p. 114; Welpi et. al., 2003, pp. 23-24). Therefore, decision-making and learning processes that engage multiple stakeholders, such as citizens, businesses, NGOs, indigenous people, and scientists, are central for driving sustainability transformations (Didham et. al., 2017, pp. 830-831; Mielke et. al., 2016, p. 75; Miller, 2013, p. 288**)**.

Empowerment through formal, non-formal and informal learning supports meaningful societal engagement and facilitates recognising contextual perspectives and finding creative and applicable bottom-up solutions (Gregory & Atkins, 2018; Herron & Mendiwelso-Bendek, 2018, p. 834). Moreover, as discussed in relation to social learning and non-formal ESD, cross-sectoral collaboration is both a way of collaboratively finding sustainable solutions and an important learning opportunity for the participants (Barth et. al., 2017, p. 813; Zachariou & Symeou, 2008, pp. 138-139). For example, Growing Up in Cities initiative demonstrates that youth participation in local decision-making can be successful both in terms of learning and

urban planning if authentic collaboration between different stakeholders is facilitated (Chawla 2001, pp. 22-24). For authentic participation and inclusion, it is crucial to embrace the principles of critical pedagogy, transformative learning and social learning by acknowledging pluralism of values and interests while engaging in a respectful dialogue and being open to premise reflection (see Freire, 1996, pp. 88-89; Ojala, 2013, p. 3; Taylor, 2007, pp. 185-186; Wals, 2011, pp. 181-183). Also, social institutions must be constructed in a way that they support intercultural dialogue and counter structural disadvantages and power inequalities (Barrett, 2017; Bash, 2012).

As the global community is dealing with wicked problems, many of which urgently require radical changes in the way societies, governments, businesses and individuals function, it is crucial to find ways to maintain hope and positive visions of the future (Brantmeier, 2013, p. 250; Freire, 1996, p. 91; Hicks, 2014, p. 109; Hofman, 2015, p. 218; Ojala, 2017, p. 76; Samuelsson, 2011, p. 112; Villanen, 2014, p. 42). Therefore, discourse concerning SD should not only focus on contrasting what to sustain and what to give in. On the contrary, living sustainably can have several positive impacts on people's lives whereas living in an unsustainable manner does not guarantee happiness or wellbeing even for the wealthiest nations. Naish (2009) argues that several societies impose people with the values of consumerism resulting in a never-ending desire of 'more' (p. 25). However, there is dissatisfaction and a rapidly increased number of mental health issues and stress-related diseases in societies based on consumerism (Maiteny, 2009, p. 179; Naish, 2009, p. 25). Simultaneously, billions of people live in poverty and material wellbeing is distributed in an extremely unequal way (United Nations, 2015, n.p.). Therefore, finding a balance between basic needs and wealth, on the one hand, and meaningful life within planetary boundaries, on the other hand, in an equal and just manner is imperative for global wellbeing.

Tipping point can be defined either as "the point in a situation at which minor development precipitates a crisis" or as "the point at which an issue, idea, product, etc., crosses a certain threshold and gains significant momentum, triggered by some minor factor or change" (Dictionary.com, n.d., n.p.). Lenton and Williams (2013) ponder whether a global tipping point affecting the whole Earth endangering its living systems is possible or if such a tipping point has already been achieved. However, Pihkala (2017) acknowledges also the possibility of a positive tipping point and the raise of major global movements advancing sustainability (p. 250). This thesis has argued that learning and education can be forces, which support achiev-

ing such a tipping point and gaining significant momentum for scaling up actions towards sustainability. Education is not a panacea for wicked problems, yet learning is at the heart of finding sustainable solutions and new ways of being and living in the rapidly changing world. All in all, as Barth and Michelsen (2013) state," transition to sustainability is -- a process of social learning in its broadest sense" (p. 103).

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